

27690/B

A
LETTER to Dr. PERCIVAL,
ON THE
PREVENTION
OF
INFECTIOUS FEVERS.

BY
JOHN HAYGARTH, M. D.

Cruttwell, Printer, Bath.

INFECTIOUS FEVERS.

PREVENTION

JOHN HAYGARIN, M.D.

CHICAGO, ILLINOIS, 1880.

A
L E T T E R
TO
DR. PERCIVAL,
Ex ON *Libris*
THE PREVENTION
OF
INFECTIOUS FEVERS.

Medicæ AND *Societatis*
AN ADDRESS

TO THE
COLLEGE of PHYSICIANS at PHILADELPHIA,
ON THE *Edinensis*
Prevention of the American Pestilence.

"Hunc lenire dolorem
"Possis, et morbi magnam deponere partem."

HOR. EP. I. I. 34.

Read to the Literary and Philosophical Society of Bath.

BY
JOHN HAYGARTH, M.D.

F.R.S. LOND. F.R.S. AND R.M.S. EDINB. AND MEMBER OF THE
AMERICAN ACADEMY OF ARTS AND SCIENCES.

BATH, PRINTED BY R. CRUTTWELL;
FOR
CADELL AND DAVIES, STRAND, LONDON.

1801.

LETTER
TO
DR. PERCIVAL
OF
THE PREVENTION
OF
INFECTIOUS DISEASES

BY
AN ADDRESS

TO THE

COUNCIL OF PHYSICIANS AT THE ACADEMY

ON THE

Prevention of the Infectious Diseases



316843

JOHN HAYGARTH, M.D.

Lecturer on the Diseases of the Army and Navy, and
Fellow of the Royal Society, and of the Royal Academy of Medicine

PRINTED BY R. EVANS

FOR

LABELL AND BATES, STATIONERS, LONDON.

1891.

TO
THOMAS PERCIVAL, M.D.

F.R.S. AND A.S. LOND. F.R.S. AND R.M.S. EDINB.

MEMBER OF THE

ROYAL SOCIETY OF MEDICINE AT PARIS;

OF THE ROYAL SOCIETY OF AGRICULTURE AT LYONS;

AND OF THE

AMERICAN PHILOSOPHICAL SOCIETY AT PHILADELPHIA;

AND PRESIDENT OF THE

LITERARY AND PHILOSOPHICAL SOCIETY OF MANCHESTER.

I. PRELIMINARY PRINCIPLES.

MY DEAR FRIEND,

YOU were involved, for a considerable ^{Congratula-}
time, in many difficulties and anxie-
ties in consequence of the exhortations
which I have addressed to you, on differ-
ent occasions, to adopt effectual measures
for the prevention of that infectious Fever
which had long and fatally prevailed in
B and

and near Manchester. But I trust that you always forgave my importunities, even when they had brought you into the greatest embarrassments, and that you now feel the purest heartfelt satisfaction, on the complete triumph of truth and humanity, which you have finally obtained. Your good sense, discretion, and firmness, aided by the like excellent qualities which your colleagues, the physicians of the Manchester Infirmary, fortunately possess, have, I hope, with unexampled success, vanquished every prejudice. Both in your alarms and your joy my mind has cordially sympathized with your's.*

* The institution of the HOUSE of RECOVERY at Manchester originated from the proposals on this subject, which, in our correspondence, I had frequently communicated to Dr. PERCIVAL on various occasions, for above twelve years. An extract from one of my letters to him, which was accidentally discovered during the contest concerning this Establishment, for the reception of Fever patients, is thus published in the Manchester Gazette, on the 23d of April, 1796:—

“ BOARD

The difficulties with which you had to struggle, will, in the end, be highly beneficial to our cause. This very con-

“ BOARD OF HEALTH.

“ The Committee have thought it adviseable to lay the following extract before the publick, in order to shew, that they have not been governed in the measures which they have adopted, by mere opinion, as has been alleged, but by WELL-AUTHENTICATED FACTS and LONG EXPERIENCE.

“ *Extract of a letter from Dr. HARGARTH to Dr. PERCIVAL, dated Chester, Dec. 29th, 1794.*

“ A typhous Fever became very epidemical among the poor in Chester, about the time it began in Manchester; our Fever wards in the Infirmary became crowded to a greater degree than they have been since the establishment of this regulation, near a dozen years ago. But these measures have checked the progress of the epidemick; very few Fever patients are now heard of in the whole town. The regulations proposed by your physicians will undoubtedly be of service; but, in my opinion, are inadequate to cure the malady. A Fever Hospital annexed to your Infirmary, to hold about twenty patients of each sex, would save a multitude of lives in your populous town. Your physicians who visit the home-patients, are exposed to imminent danger of contagion; in a well-ventilated, clean hospital, the medical attendant is not, I apprehend, liable to infection. I am, and have been for several years, collecting facts to illustrate various questions relative to this interesting subject.”

test

test has been the means of noticing and recording numerous interesting facts; it has more generally excited the publick attention to this subject; the transaction has attracted the observation, not only of physicians, but of other leading characters in society, who are most eminent for their knowledge and beneficence. Whenever an epidemical Fever spreads fatally among the people, the most intelligent part of mankind will now recollect how easily and effectually the calamity may be prevented.

Fatal Effects
of Contagion

I have long thought, that there is no subject on which a physician could employ his time and ability more advantageously for the benefit of his fellow-creatures, than in the investigation of the nature of febrile Contagion, in order to ascertain the laws by which it is communicated, and by what means it may be prevented. It is well known to be the
cause

cause of very extensive destruction among mankind; especially in the army, the navy, and all large towns. These calamities appear to proceed from error and ignorance, rather than from the inevitable danger of the Distemper. By an attentive observation of facts, and by rational arguments founded upon them, conclusions of great importance seem to be brought fairly within our comprehension and knowledge.

So long ago as 1774, you may remember, that an enumeration of the inhabitants of Chester was undertaken under my direction. Upon this occasion, I instituted such medical investigations as so fair an opportunity presented. My attention was particularly attracted by two epidemical Distempers, the Small-Pox and an infectious Fever, which, that year, had prevailed in the city. But the latter Contagion had spread in no unusual degree,

First Proposal of Fever Wards.

gree, and would undoubtedly have passed without notice, if the questions necessary for the purpose of numbering the inhabitants had not brought it under my special consideration.

Out of sixteen columns of inquiry which were answered in this survey, seven of them were engaged in ascertaining the state of these two Distempers. In the paper “*on the Population and Diseases of Chester,*” which was re-printed in the Philosophical Transactions in 1775, the original idea of checking the progress of infectious Fevers among the poor is fully and explicitly proposed in the following words:—

“ Another reason of mortality in the suburbs (of Chester) seems to be, that their inhabitants in general are of the lowest rank: they want most of the conveniencies and comforts of life: their houses are small, close, crowded, and
dirty.”

dirty.” “ In these poor habitations, when one person is seized with a Fever, others of the family are generally affected with the same Fever, in a greater or less degree.”

“ If a regulation could be universally adopted, of immediately removing out of the family such of the poor people as are seized with Fevers, it is evident that the most salutary consequences would follow. Reasonable objections might be made to receive such patients into the general Infirmary, even into separate wards, lest the Infection should spread through the whole house. But might not this and every other objection be obviated, by erecting on the ground which adjoins and belongs to the Infirmary, a small building to be divided into spacious airy apartments, where patients infected with Fevers, and properly recommended, might be received on any day of the week? Besides
medical

medical assistance, they would here enjoy clean linen, airy rooms, careful attendance, and wholesome diet.”

This proposal excited no attention until 1783, when the inhabitants of Chester were alarmed by the progress of an infectious Fever, which was fatal to some of our most respectable fellow-citizens.

The Progress
of infectious
Fever first
noticed.

In 1777, I began to ascertain, by clinical observations, according to what law the Variolous infection, and in 1780 and 1781 according to what law the Febrile infection, is propagated. I found that the pernicious effects of the variolous miasms were limited to a very narrow sphere. In the open air, and in moderate cases, I discovered that the infectious distance does not exceed half a yard.* Hence it is probable that, even when the Distemper is malignant, the infectious influence extends but to a few yards from

* See the *INQUIRY how to prevent the Small-Pox*, p. 97.

the

the poison. I soon also discovered, that the Contagion of Fevers was confined to a much narrower sphere. Upon these principles, which it is the main purpose of this letter to explain and establish, I discerned the safety and wisdom of admitting Fever patients into separate wards of the Chester Infirmary itself, instead of an adjoining building, as I had proposed in 1774.

We are more accurately acquainted with the properties of the variolous than any other febrile poison; because the infecting matter is perceptible by our senses of sight, touch, and smell; and because the practice of inoculation has greatly extended our knowledge on this subject. For these reasons, the same mode of investigation will be pursued on this question, as was followed in the “*INQUIRY how to prevent the Small-Pox,*” and in the “*SKETCH of a Plan to exterminate the casual*

casual Small-Pox from Great-Britain,"
which I published in 1784 and 1793.

Typhus de-
scribed.

The following observations on Contagion are chiefly confined to what has been denominated the low, slow, nervous, putrid, petechial, malignant, pestilential, jail, ship, camp, hospital, &c. Fever, or Typhus. For the sake of accuracy, a brief description of it may be proper.

You know that the Typhus is commonly caught from infection, though it is probably sometimes produced by other causes. It usually begins with slight irregular chills, alternating with heat. The following symptoms succeed—a remarkable prostration of strength; great lassitude; pain on the exertion of muscular motion; a languid countenance; depression of spirits; sighs; a loss of appetite, with a loathing of food; frequently sickness, sometimes attended with vomiting; thirst; deafness; watchfulness, or disturbed

turbed slumbers with disagreeable dreams. The bowels are sometimes costive, sometimes loose, with an increased discharge of bile. The pulse is generally weak, and often, but not always, frequent. The heat of the body is generally less increased than in most Fevers, but is sometimes so great as to give a sense of burning heat, when the skin is touched. The patient has very often a head-ach, but seldom any fixed pain in other parts of the body. This Fever is of very uncertain duration, but usually continues for several weeks; and sometimes, even with these symptoms of the *mild Typhus*, proves fatal.

In this Fever, more malignant symptoms often appear, as, *subsultus tendinum*, with more general tremblings and twitching; hiccup; delirium; brown, or black sordes on the teeth and tongue; *petichiaë*; *vibices*; clammy sweats; an offensive bilious or bloody dysentery, with other
signs

signs of putrefaction; *coma*; involuntary excretions.

First Observations on the Nature of Febrile Infection.

My first observations to discover the laws by which the febrile Infection is communicated, began in two Cheshire villages; at Raby in 1780, and at Barrow in 1781. As the latter afforded the most instructive cases, I shall particularly state them.

Mr. CHEERS, a farmer of Barrow, on the 21st of April, 1781, went a journey to Manchester, Cheadle, &c. and returned home on the 24th.* At that time, his family and neighbours were entirely free from all epidemical Distempers. He was attacked by an infectious Fever on the 22d of May, that is, on the 29th day after his arrival at his own house. Sixteen other persons in this family were affected with a similar Fever, at the periods stated in the Ist. Table. His

* See Table I.

wife,

wife, who was his constant nurse, and exposed to the infectious miasms from the beginning, did not sicken till the 37th day. In regard to the intimacy of intercourse among the rest of the family, a sufficiently accurate statement of facts was not recorded.

You will recollect, my dear Friend, that at this time (1781) my attention was much engaged in the investigation of the nature of the variolous poison. I was struck with the difference of the periods in these two Distempers, during which the infection remains in a *latent state*, that is, the interval of time which elapses between the patient's exposure to the pestilential influence, and the commencement of the Fever. In the *Typhus*, this period appeared to be much longer than in the Small-Pox.

Latent Period of Typhous Fever

In this family, the proportion of persons infected with the Fever was much greater

greater than I had expected. Such views of the nature of the poison excited my attention, and an anxious desire to determine, whenever future opportunities might occur, whether these laws were established or confuted by more extensive observations.

Symptoms
of the Fe-
ver.

It will be proper to give a short description of the Distemper which attacked the first family. The Fevers which are denominated low, nervous, putrid, &c. may possibly be of different species or varieties. They may be subject to different laws in regard to the period during which the infection remains in a *latent* state in the body; the quantity of poison required to produce infection; and the proportion of mankind liable to receive the Distemper. In this family, the symptoms were—chilly and hot fits; lassitude; head-ach; pain of the back; giddiness; loss of appetite for food; thirst; watchfulness

watchfulness or disturbed dreams; delirium; deafness. Two had a looseness. The father, who brought the Fever into the family, was ill of it for more than two months. They all recovered.

Clear, distinct, and instructive cases of Fevers communicated by infection are with difficulty obtained. The eight following families* (the II. III. IV. V. VI. VII. VIII. and IX.) came under the observation of Mr. CONNAH, and the three subsequent families (X. XI. and XII.) were attended by Mr. MANNING, when apothecaries of the Chester Infirmary. In almost all these eleven families, the accuracy of their statement was confirmed by my own knowledge of the facts. The account of the progress of Infection in the nineteen next families, (from the XII. to the XXX. inclusive) was communicated in consequence of my inquiries on this

By whom
Cases ob-
served.

* See Table I.

subject,

subject, by Mr. TAYLOR, surgeon and apothecary, of Middlewich in Cheshire. Of the fidelity of these reports, I have reason to be fully satisfied, knowing, from long and frequent intercourse with these medical practitioners, that they were all well qualified to give a faithful and judicious account of the progress of the Distemper.

Reduced to
a synoptical
View.

The conclusions submitted to your consideration are deduced from cases so authenticated, and are accurately but succinctly stated in the form of Tables. If they had been otherwise related, the narration would have occupied many pages, and would have exhibited a tedious, and much less distinct, representation of facts. In this synoptical view, are impartially exhibited all the cases which I have been able to ascertain with sufficient correctness.

In

In March 1798, just before my departure from Chester, I received some information relative to an infectious Fever, which had spread through some Cheshire villages, perhaps propagated from the Distemper which I had noticed at Raby, as before-mentioned, in 1780, being in the same neighbourhood. But the facts had happened at some distance of time, before my questions on this subject were proposed, and I ceased to have personal and professional intercourse with my medical informer; so that my intelligence was not so full and accurate as was requisite to establish any useful and satisfactory conclusions.

In the first place, let me desire you, Tables of Fevers. my good Friend, to examine, with minute attention, the following Tables, which explain the progress of infection through families. Weigh well the facts therein stated. This may seem to be an irksome task, and

to many readers it might be so. But I know, from our long and intimate friendship, how highly you value information relative to facts, which can advance medical knowledge, especially if it can be applied to alleviate human misery. You may be, as I was, surprised to find what a large proportion of mankind are capable of receiving this Fever, when fully exposed to the influence of the infectious poison; that is, when confined for days and nights, in the same small close and dirty room, with a patient ill of the Typhus.

TABLES

FEVER CASES.

TABLE I.

Progress of infectious Fevers in Families.

Families.	Patients.	Date when attacked.	Date when Fever began after exposure to infection.	Infected.	Uninfected.		
I.	1. Mr. Cheers.	May 22, 1781.	29th,	17	3		
	2. Mr. Jas. Cheers.	June 13,	23th,				
	3. Nancy Walkley,	June 20,	30th,				
	4. Nelly Oulton,	— 20,	30th,				
	5. Tho. Langley,	— 20,	30th,				
	6. Master Cheers,	— 27,	37th,				
	7. Mrs. Cheers,	— 27,	37th,				
	8. Miss Cheers,	— 27,	37th,				
	9. Mr. S. Cheers,	— 27,	37th,				
	10. John Nield,	— 27,	37th,				
	11. { Mary Newport	— 27,	37th,				
	12. { and husband,						
	13. Nancy Rowlands,	July 4,	44th,				
	14. Jas. Thomson,	— 8,	48th,				
	15. Mary Deakin,	— 24,	15th,				
	16. Martha Sefton,	— 24,	63d,				
	17. Robt. Bentley,	Aug. 7,	23d,				
II.	18. Mich. Adams,	Feb. 28,	4	0			
	19-20. S. & E. Adams,	March 25,			26th,		
	21. John Adams,	— 25,			26th,		
III.	22. Ann M'Donald,	March 10, or April 3,	1st or 25th,	1	0		
IV.	23. Eliz. Fleet,	April 3,	25th,	6	0		
	24. Sarah Fleet,	May 5,	33d,				
	25. T. Fleet, jun.	May 28,	56th,				
	26. Tho. Fleet, sen.	— 30,	58th,				
	27. Mary Fleet,	June 1,	60th,				
	28. Wm. Fleet,	— 4,	63d,				
V.	29. Wm. Griffith,	March 8,	2	0			
	30. Mary Griffith,	— 30,			23d,		

PROOFS AND ILLUSTRATIONS.

1. Mr. Cheers went a journey to Manchester, Cheadle, &c. on the 21st of April, and returned home on the 24th.
- 2-16. These cases except the 15th were reckoned from the commencement of Mr. Cheers's Fever.
- 1-17. Four of this family, two of them nurses, were said to have remained uninfected. But as this part of my intelligence was received in consequence of inquiries, after sixteen years had elapsed, and as one of the four (the 4th in the Ist Table) was noted by me, at the time, to have had the Fever, it is probable that some of the rest might have suffered slight symptoms of it, which escaped notice or recollection. However, I have allowed in the Table that three remained uninfected. This family received frequent visits from four relations and neighbours; yet none of them was infected; probably because none of them, during each visit, had been exposed to an infectious dose of the poison.
15. Mary Deakin was a char-woman, taken into the house on the 10th of July. Her Fever commenced on the 24th, which is the 15th day after exposure to Infection.

TABLE I. continued.

Families.	Patients.	Date when attacked.	Date when Fever began after exposure to infection.	Infected.	Uninfected
				30	3
VI.	31. Eliz. Robinson,	March 30,		}	0
	32. Mary Robinson,	May 3,	35th,		
VII.	33. A. Darlington,	June 14,		}	0
	34. T. Darlington,	— 30,	17th,		
	35. E. Darlington, jun.	July 8,	25th,		
	36. E. Darlington, sen.	— 10,	27th,		
	37. Job Darlington,	— 22,	6th,	}	0
VIII.	38. Mary Hughes,	June 30,			
	39. Thomas Hughes,	July 14,	15th,		
	40. John Hughes,	— 26,	27th,		
IX.	41. Eliz. Bithel,	— 21,		}	0
	42. Edward Bithel,	Aug. 17,	28th,		
X.	43. Thomas Edson,	July 19,	Not more Not less	}	0
	44. Jane Edson, sen.	Aug. 1,	16th, 12th,		
	45. Jane Edson, jun.	— 16,	28th, 24th,		
	46. John Edson,	— 18,	30th, 26th,		
	47. Humphrey Edson,	— 31,	31st, 27th,		
XI.	48. Jane Parry,	July 31,	17th,	}	0
XII.	49. J. Edwards, jun.	June 12,	5th,		
	50. Sarah Edwards,	July 5,	24th,	}	0
	51. H. Edwards,	Aug. 1,	51st,		
	52. J. Edwards, sen.	— 26,	76th,		
XIII.	53. Hoskinson. Son,	{ July 27, C. home 28		}	0
	54. ——— Mother	Aug. 23,	27th,		
	55. ——— Father	— 24,	28th,		
	56. ——— Daughter	— 24,	28th,		
	57. — Another Child	— 29,	33d,		
	58. ——— Another	Sept. 25,	60th,		
	59. ——— Another	— 31,	60th,		

PROOFS AND ILLUSTRATIONS.

37. Job Darlington came home into the infectious family July 17th.
43. Tho. Edson was admitted into the Chester Infirmary on the 23d of July, which was the 5th day of his Fever. This house was particularly offensive, with a pig-stye on one side. There was no window to admit a thorough air.
48. Anne Parry became a night-nurse of the Fever Wards of the Chester Infirmary on the 7th, and was discharged on the 17th of July. Her Fever began on the 31st.
49. "J. Edwards visited a boy ill of a Fever on the 8th of June."
- 53-58. "This family were all equally exposed, as the house consisted of a very small kitchen and one room over it only, which contained two beds, in which all the family slept, and were in a most dirty wretched condition. The mother (54) died on the 11th day. The father's (55) Fever came to a crisis on the 14th day. The manner in which the first patient (53) received the Fever cannot be traced; probably from some of the neighbours who were then ill of it."

TABLE I. continued.

Families.	Patients.	Date when at- tacked.	Date when Fe- ver began after exposure to infection.	Infected.	Uninfected.
				59	3
XIV.	60. Littlemore, 1st child	Aug. 5,		}	5
	61. ——— Mother,	—— 31,	27th,		
	62. ——— 2d child,	Sept. 2,	29th,		
	63. ——— 3d child,	—— 5,	42d,		
	64. ——— 4th child,	Uncertain,		}	2
	65. ——— Father,	Not infected,			
XV.	66. Dod. Wife,	Sept. 14,	40th,	}	0
	67. ——— Husband,	Oct. 4,	21st,		
XVI.	68. Thomas Davis,	June 13,	9th,	}	18
	69. Alice Parkinson,	Aug. 1,	50th,		
	70. Joseph Walton,	—— 8,	57th,		
	71. Joseph Davies,	—— 12,	13th or 61th		
	72. Miss E. Sutton,	—— 13,	15th or 62d		
	73. S. Davies,	—— 14,	63th,		
	74. Miss B. Sutton,	Sept. 27,	46th,		
	75. Mr. Sutton,	75-85. These			
	76. Mrs. Sutton,	eleven patients			
	77. Mr. T. Sutton,	were all affect-			
	78. Mr. Jos. Sutton,	ed with Fever,			
	79. Mr. John Sutton,	but not so as to			
	80. Mr. A. Sutton,	confine them.			
	81. R. Br.	They had head			
	82. A man-servant,	ach, pain of the			
	83. Another.	limbs, thirst,			
	84. Another,	languor, &c.			
	85. Another.				
XVII.	86. Eliz. Davies,	July 4,	22d,	}	3
	87. Joseph Davies,	—— 30,	48th,		
	88. John Davies,	Aug. 14,	16th,		

PROOFS AND ILLUSTRATIONS.

60-65. " This family lived in a small dirty house; slept in the same room, and were all, except the father, equally exposed to Infection. He is a boatman, and seldom at home. He never slept at home during the time the family had the Fever; therefore was not sufficiently exposed."

66. " I. Dod's wife attended Littlemore's (XIV.) family from the first attack of his daughter, (60) which was the 5th of August. She communicated the Fever to her husband. They were old people, and both died on the 6th day."

XVI. 68-85. " Mr. and Mrs. Sutton, of Kinderton-Hall, with seven sons and daughters, three men and six women servants, in all 18, were infected. T. Davies (68) first brought the Fever into the family. He was at Middlewich on the 5th of June, at a house adjoining to one where some people were ill of a Fever. A. P. (69) sat up with the said patient from the first attack on the 13th of June. No. 70 was in the same room with No. 68 frequently during his illness. No. 71 was occasionally with his brother 68 from his first attack. No. 73 was often with his brother (68); also with his father, who was ill from the 30th of July. B. Sutton (74) was not exposed to 68, the utmost caution being used, but lay with her sister (72) from her first attack of Fever, Aug. 13th. She had a slight affection some time before. No. 86, the mother of No. 68, who attended him, sickened July 4th; and No. 87, the father, July 30th. Both these patients, as well as 69, were often in the kitchen, and Miss E. Sutton was often with them, so that in all probability she received Infection from 87, on the 15th day after exposure."

XVII. " Eliz. Davies, (86) mother of 68 in Mr. Sutton's family, attended him night and day from the 13th of June. She had but a slight Fever, and was not confined to her bed. J. Davies (87) attended his son (68) at Kinderton-Hall, from June 13th, at intervals, night and day. He was very ill, but still able to sit up in the kitchen. No. 88 was a child infected by his father (87) or else by P. Walton (89)."

TABLE I. continued.

Families.	Patients.	Date when at- tacked.	Date when Fe- ver began after exposure to In- fection.	Infected.	Uninfected.
XVIII.	89. P. Walton,	July 28,	—	87	4
	90. Mary Walton,	Aug. 12,	16th,		
	91. Betty Walton,	— 20,	24th,	8	0
	92. A child,	Sept. 28,	63d,		
	93. Another,	Doubtful,	—		
	94. Another,	Doubtful,	—		
	95. Another,	Doubtful,	—		
XIX.	96. Another,	Doubtful,	—	4	0
	97. R. Dod's wife,	Aug. 21,	21st,		
	98. R. Dod,	Sept. 13,	24th,		
XX.	99-100. Two Infants,	Doubtful,		2	1
	101. Johnson. Son,	Sept. 26,			
	102. — Mother,	Oct. 25,		2	1
	103. — Father,	Not infected			
		Dec. 1.			

PROOFS AND ILLUSTRATIONS.

XVIII. " This family lived in a small but clean house. The two last were slightly affected."

XIX. 97. " Called at Walton's (XVIII.) 1st of Aug."

XX. " This family lived next door to Hoskinson's (XIII.) The wife attended and slept in the same room with her son. A small house. Father not infected on 1st Dec."

XXI. " The

TABLE II.

*Families at Middlewich, who laboured under continued
Fever of the low putrid and petechial kind in
1795 and 1796, attended by Mr. Taylor.*

Families.	Patients.	No. in a Family.	re- ced.	Uninfected.
XXI.	J. Griffith,	3	3	0
XXII.	T. Almon,	9	9	0
XXIII.	S. Limeburner,	5	3	2
XXIV.	J. Eaton,	3	3	0
XXV.	N. Postles,	8	7	1
XXVI.	T. Wolsey,	6	5	1
XXVII.	R. Siddell,	4	4	0
XXVIII.	T. Percival,	4	4	0
XXIX.	E. Authorn,	7	7	0
XXX.	J. Archer,	9	9	0
XXXI.	C. Hool,	7	7	0
XXXII.	W. Prince,	3	3	0
XXXIII.	J. Houghton,	12	3	9
XXXIV.	Mr. Pott, <i>Cotton-Hall</i> ,	16	15	1

183 19

PROOFS AND ILLUSTRATIONS.

- XXI. "The Fever was petechial, in a lodging-house, small, close, and dirty."
- XXII. "The whole family lay in the same room. The house was close and filthy. No change of linen. A bad nurse."
- XXIII. "Next door to the above house. Not certain whether the children were slightly affected with the Fever. If they were, it was imperceptible by the mother."
- XXIV. "Eaton's wife attended Almon's family." XXII.
- XXV. "Small close house. All lay in the same room. The one exempted lay with the others, and was never heard or observed to be affected."
- XXVI. "T. Wolsey is a boatman; slept at home only once or twice with his wife, who was only very slightly affected. The rest of the family were very ill. A very small dirty house; a few doors from XXV."
- XXVII. "The next door to XXVI.; was small and dirty."
- XXVIII. "A few doors from XXVII. Husband and wife slightly affected."
- XXIX. "Opposite to XXVIII. All slept in one room. All slightly affected."
- XXX. "A remarkable filthy house and filthy family; caught the Fever at Macclesfield. The father was the only one who had the Fever slightly; says he was very ill one day with head-ach and pain of his limbs. Very poor."
- XXXI. "Very poor. A remarkable filthy small house."
- XXXII. "Mother of W. Prince; caught the Fever from him and died."
- XXXIII. "A cotton factory, which employs several hands besides these twelve, who sleep in the house. Several rooms. In this family the utmost caution was used to prevent the spreading of the Infection, by ablution of the face and hands of the sick persons with warm vinegar, frequent changes of linen, white-washing the walls; washing the floors; burning pitch; sprinkling vinegar; frequent ventilation; removal of the chamber-pots, and every thing that could tend to accumulate the infectious vapour."
- XXXIV. "The one exempted was a child four months old, on the breast, while the mother was ill. The utmost pains were taken to prevent the spreading of the Fever."

TABLE III.

Days when Fever commenced, after exposure to Infection, in Seventy-Two Cases, arranged out of the first Table.

Day.	Cases.	Total.	Day.	Cases.	Total.
1st	22?	1?	33d	24, 57	2
5th	49	1	35th	32	1
6th	37	1	37th	6, 7, 8, 9, 10, 11, 12	7
9th	68	1	40th	66	1
13th	71?	1?	42d	63	1
15th	15, 39, 72?	3	44th	13	1
16th	44, 88, 90	3	46th	74	1
17th	34, 47	2	48th	14, 87	2
21st	67, 97	2	50th	69	1
22d	86	1	51st	51	1
23d	2, 17, 3	3	56th	25	1
24th	50, 91, 93	3	57th	70	1
25th	22, 23, 25	3	58th	26	1
26th	19, 20	2	60th	27, 58	2
27th	21, 36, 40, 54, 61	5	61st	71?	1?
28th	42, 45, 55, 56	4	62d	72?	1?
29th	1, 62	2	63d	16, 28, 73, 92	4
30th	3, 4, 5, 46, 102	5	66th	59	1
31st	47	1	76th	52	1
		44			31
					44

Out of 202, the whole number of persons stated in the Ist Table, only 19 escaped Infection. But it is manifest, from the circumstances related in the explanatory notes, annexed to the Table, that, in the three following families, several individuals were not sufficiently exposed to the poison.

Families.	Persons not sufficiently exposed.	Not infected.	Proportion liable to infectious Fevers.
XIV.	— 1	— 1	
XXVI.	— 1	— 1	
XXXIII.	— 12	— 9	
	<hr/> 14	<hr/> 11	

Therefore, from 202 should be subtracted 14, and there will remain 188, the number exposed. And from 19 should be subtracted 11; then 8 will remain, the number who escaped Infection. Eight in 188 is less than *one in twenty-three*.

If, in like manner, we deduct the whole first family consisting of 20 persons,

as

as there were some doubts whether they were all sufficiently exposed, and whether 3 of them entirely escaped the Fever; then there will remain only 5 uninfected out of 168 exposed to Infection, or less than *one in thirty-three.*

Though an induction from facts never amounts to a demonstrative proof, yet the farther it is carried it approaches the nearer towards a complete discovery of the laws of nature. The cases here adduced are sufficiently numerous to establish a pretty accurate conclusion. They clearly prove that a very large proportion of mankind are susceptible of infectious Fevers. It hence appears that as many persons are liable to receive the Typhous as the Variolous Contagion, and probably more, even if the persons who have had the Small-Pox be excluded from the comparison; and, in a far greater number, if we take into consideration
that

that the latter Distemper can only be suffered once, but the former an indefinite number of times.

The truth of this proposition being fully proved, deductions from it may be received with confidence. Upon this foundation, it may fairly be argued in what circumstances febrile Infection is communicated, and where there is perfect safety from danger. Though the exact line between hazard and security might be drawn with some uncertainty, yet at any distance, upon each side of it, we can speak with decisive confidence.

The same mode of reasoning as was successfully employed in the INQUIRY *how to prevent the Small-Pox*, may be equally applicable to the present question. It was there calculated, upon the *datum*, that only 1 person in 20 is naturally exempted from the Distemper; that if two together have escaped, the probability

that they were never both exposed to an infectious quantity of the poison is above 400 to 1; if three in a family have escaped above 8000 to 1.*

The truth and accuracy of this calculation have been warranted by subsequent experience, as explained in the *SKETCH of a Plan to exterminate the Small-Pox*, p. 536, 7, 8, and 9. The conclusion therein-stated, as the result of general observation, by my medical correspondents, as well as by my own, is comprehended in these words. “Therefore when three or more persons, together, have escaped the Small-Pox, we are warranted to infer, upon evidence of high authority, that all of them have not been exposed to the Contagion.”

It is too obvious to require a remark, that this mode of reasoning is as ap-

* This mode of reasoning is fully explained in the *INQUIRY*, (p. 24—31) which pages the reader ought to peruse and attentively consider.

plicable, and on clearly convincing evidence, to the Typhous, as to the Variolous Infection; whether the proportion naturally exempted from the former Distemper be 1 in 23, or 1 in 33.

If all the cases in succession, where persons have breathed the air of a chamber of a patient ill of a contagious Fever, and yet have escaped Infection, were estimated in this mode of calculation, the chances would be not only of thousands but of millions, indeed *many millions*, to one, that such persons had not been exposed to an infectious dose of the poison. But facts of this kind are so generally known and so frequently fall under the observation of every medical visitor, that no calculation can be required to establish this truth. The conclusions are sufficiently obvious to common sense.

By the assistance of these preliminary principles we are well prepared to in-

What dose
of Typhous
Poison in-
fectious.

quire

quire what dose of the Typhous poison is required to produce Infection. The quantity will undoubtedly vary according to different circumstances, but we shall be enabled to judge with some accuracy, what are the limits of this variation.

In this whole investigation, you will, I am certain, keep in mind one medical truth, it cannot be called a theory, a term often applied to doubtful disquisitions. The larger the dose of a poison or drug, the greater in general is the effect which it produces. Many of the most powerful and salutary medicines, when taken in too large a quantity, are poisons, as, opium, antimony, mercury, hemlock, aconite, foxglove, &c. Even arsenic itself, the most virulent and unmanageable of all poisons, by the skill and attention of physicians, has been reclaimed from the class of mischievous substances, and by a diminution of the dose is held, on good authority, to be a safe and useful remedy.

On this subject, a farther analogy ought to be taken into consideration. In different constitutions, and in different dispositions, there is a certain degree of variety in the operation of any drug; in some more than others. Few drugs are so uncertain in their effects as antimony; four or six times the dose of it may be required for one patient more than for another, or for the same person in different diseases. In most other medicines and poisons, the difference between the least and greatest operating dose is much less than what is here stated. The mischievous quantity of infectious miasms, as might be expected, from the analogy here explained, admits of some degree of variation. They propagate the Small-Pox, however, with much uniformity, as has been proved in the INQUIRY and the SKETCH. It is not improbable that debility, or indisposition, or fear, or exposure to

to cold or fatigue, or, as some suppose, a difference of diet, may occasion greater variety in the quantity of poisonous miasms requisite to produce an infectious Fever than the Small-Pox. In these peculiar circumstances, a sufficient, which can only be a small, allowance may be made for the difference, without much difficulty.

The Ty-
phus not
infectious
in a clear,
large, airy
room.

With the facts recorded in the Ist Table and these remarks in our view, let us proceed to contrast them with other facts of general notoriety which have fallen under my own observation, and, in incomparably greater numbers, have been witnessed by other practitioners. When the chamber of a patient ill of an infectious Fever is spacious, airy and clean, few or none even of the most intimate attendants will catch the Distemper. Among the middle and higher ranks of society in Chester and its neighbourhood, during a period of 31 years, I scarcely recollect a single instance of

of the Typhous Fever being communicated to a second person, not even during the epidemics of 1783 and 1786, which excited a general alarm in that city. Fresh air and cleanliness were the only means which I employed to prevent Infection. Doors and windows were kept open as far as the season and other circumstances would permit. Curtains were drawn to exclude light, but not the free circulation of air. All clothes, utensils, &c. used by the patient, were immersed in a vessel of cold water immediately, and when taken out of it carefully washed. The floors were kept clean, and vinegar was sometimes but not always employed to sprinkle them. It was thought to be more easy and more safe to remove than to correct the poison.

The performance of these regulations, was required with great punctuality.

They

They were found to be fully adequate to the purpose.

Infection

seldom soon
caught even
from the con-
centrated im-
pregnation of
the air.

Again, medical practitioners are exposed to still more imminent danger. They visit patients ill of infectious Fevers, even in small, close, and dirty apartments. Sometimes, indeed, they unfortunately suffer: but many thousands of such visits escape without injury, for one instance of Infection. During four years attendance in the hospitals of Edinburgh and London, and afterwards during thirty-one years in private practice in Chester,* and fourteen years and a half in the Chester Infirmary, and three years at Bath, I have been in the habit of breathing air strongly impregnated with the infectious miasms of Fever. In many, very many instances, I have visited patients ill of infectious Fevers in small, close, and dirty rooms; yet never but

* Till 1783 infectious Fevers were excluded from the Chester Infirmary. once,

once, above thirty years ago, had a Fever. Your physicians of the Manchester Infirmary for many years, and particularly during the late widely-spreading epidemics, in your large and populous town, have, with great fortitude and humanity, constantly visited the home patients, that is, they have, in innumerable instances, breathed the most pestilential air, in the most concentrated state. Their and my safety manifestly proceeded from this circumstance; we remained but a short time in the patient's room. We did not respire an infectious dose of the poison.

Hence it appears, that air strongly impregnated with infectious miasms may be breathed for a short time, and air weakly impregnated for a long time, without any injury. We might hence be led to believe, that the poisonous miasms do not generate a Fever, till they have been respired without interruption, for several days

days together. And it is not improbable that, in some persons, such an accumulated quantity of the poison may be required.

Yet Infection
is sometimes
suddenly
caught.

But, on the contrary, other facts manifestly prove, that a short exposure to a pestilential atmosphere can, in some instances, produce a Fever. The case of Mr. Cheers (Ist family) is manifestly of this kind. In a few days he visited different towns and several old acquaintance, and consequently could not have remained long together in any particular situation. The numerous examples of Infection being caught by medical visitors, in the chambers of their patients, although they seldom remain for half an hour,, and generally for a much less space of time, in the pestilential atmosphere, manifestly prove, that a short and probably a momentary exposure to the Contagion, in some instances, excites a Fever. Two of
my

my patients, who were physicians, ascribed their Infection to a short exposure to the poison. One of them thought, that he caught the Fever by creeping behind, in order to assist, his patient; the other by inspecting morbid fæces.

Some have imagined, that medical persons are less liable to be affected with the infectious poison than others, because they are more frequently accustomed to breath a certain portion of it. But this argument is carried much farther than analogy will warrant. Take an example where the efficacy of a drug is most remarkably diminished by long and frequent use. Opium, perhaps more than any other medicine, requires a gradually-increasing dose, to produce the same effect. But, if opiates are omitted, even for a short interval, the patient, on the recommencement of their use, perceives the ordinary effect from the ordinary quantity

Medical, not less than other visitors, liable to Infection.

quantity. Whereas medical men are never constantly in the habit of breathing pestilential air, nor is the dose of it gradually increased. Consequently, after a short interval of time, during which they cease to breathe poisonous miasms, they become as susceptible of mischief from the poison as any other person.

Prisoners
less liable to
Infection.

But prisoners, confined in the pestilential vapour of a jail, are in a situation totally different. The quantity of poison which they breathe may gradually increase, and by this means, they are enabled to bear, with impunity, a much longer dose of it than others. Thus it is a well-known fact, that felons have worn clothes without injury which nevertheless communicated Infection to fresh persons in a court of justice.

The poison
is infectious
at a greater
distance in
air vitiated
by respira-
tion.

Another view of the subject deserves consideration. It is generally allowed, that putrid Fevers are *generated* by a great number

number of persons crowded together into the same room, as in a ship, jail, &c. probably from some depravation or corruption of the air by respiration. To this cause we may probably ascribe some events, which might otherwise seem to be exceptions to the preceding observations. Several instances have been recorded, where Infection was communicated, in crowded courts of justice, at a greater distance from the poison; than in the cases above related, as what is the uniform result of my own observations. May not this difference be fairly ascribed to air vitiated by a crowd of people? It is well known, that a court of justice is always a very spacious apartment, and that the doors and windows in it are generally open for the admission of fresh air. It is directly contrary to what happens in a private apartment, that so many persons and at so great a distance from the

the poison in a large and well-ventilated room, should be infected together. I am warranted to make this observation by the uniform testimony of all my own experience, for a long series of years, during which I have carefully attended to this question. And the testimony of my medical brethren will fully confirm this remark with perhaps some apparent exceptions, which may be explained upon the principles here advanced.

It may be a subject of consideration, whether the mischief produced by the Contagion of prisoners in a court of justice may not be ascribed to the increase of malignity in the febrile poison when it has long lodged and putrified in dirty clothes and confined air in a state usually denominated *Fomites*.

Whether the causes above assigned, or what other cause may have produced the difference, it might be difficult absolutely
to

to determine by satisfactory proofs. But it appears evident that these famous examples are not conformable to the law usually observed by nature in the propagation of this poison, but that they are exceptions to the law, for some local reason.

To the same cause I am disposed to attribute another very interesting and well-authenticated fact. From a letter of Mr. W. Henry, printed in the Manchester Chronicle in June 1796, and from other information, it appears that medical students who attend the Fever patients in the Edinburgh Infirmary, have sometimes unfortunately caught the Infection. In such large and well-ventilated apartments it cannot be apprehended that an infectious Fever could be communicated, unless, as in this case, when the students are “very numerous, and constantly crowd around the beds of the patients afflicted with

with Fevers.” Two causes of Fever appear to be here combined. The air is vitiated both by respiration, and by febrile miasms. Some might ascribe the calamity which has been produced in courts of justice to the supposed greater malignity of pestilential *Fomites*, heightened by the putrefaction of a jail. But in the wards of an Infirmary, where the strictest attention to cleanliness is known to be observed, no such *Fomites* can possibly be suspected.

The Variolous Poison infectious at a greater distance than the Typhous.

The whole evidence which I have been able to collect incontestibly leads to this very important conclusion, that febrile Infection extends but to a very narrow sphere from the poison. It was upon this solid foundation that I ventured originally to propose the reception of patients ill of infectious Fevers, into wards appropriated to the purpose in the Chester Infirmary. The uniform success of this establishment

fully warranted my repeated recommendations of like regulations to check the fatal progress of Fevers at Manchester, particularly in answer to your inquiry relative to this subject in Dec. 1795.* You

* In a letter to me from Dr. PERCIVAL, dated Dec. 30th, 1795, there is the following paragraph. "We have this afternoon had a meeting at my house, to consider of the best means of stopping the progress of the low Fever now so prevalent in Manchester and the small towns in the neighbourhood. It has been agreed to call together some of the most intelligent persons of this place, and to propose to them the formation of a BOARD of HEALTH on a general and comprehensive plan. Permit me to request, that you will weigh this interesting subject in your mind, and that you will furnish me with your observations upon it in time for communication to the gentlemen when they assemble on Thursday the 7th of January."

The following is an extract from my answer, of which the chief part was published in the Manchester Newspapers, and in the first Report of the BOARD of HEALTH.

To Dr. PERCIVAL.

"Chester, Jan. 6th, 1796.

"YOU may remember that, for the last twelve years, we have received all infectious Fever patients who require assistance, into two Fever Wards, one for each sex, appropriated to this purpose, in the Chester Infirmary.

will recollect that, upon this very interesting occasion, I assured you that the pernicious atmosphere of infectious Fevers was limited to a much narrower extent than even that of the Small-Pox.

Infirmary. This institution arose from the speculations on the nature of Contagion, which, you know, had engaged much of my attention. Numerous facts having proved, that a person liable to receive the Small-Pox was not infected by a patient in the Distemper, when placed at a very little distance; I next considered the nature of the Contagion which produces putrid Fevers. I soon discovered, that their infectious atmosphere was limited to a *much narrower* extent than even that of the Small-Pox. I observed, that in a clean, well-aired room, of a moderate size, the contagious poison is so much diluted with fresh air as very rarely to produce the Distemper, even in nurses exposed to all the putrid miasms of the breath, perspiration, and other discharges. Whereas, in the close, dirty, and small rooms of the poor, the whole family, in general, catch the Fever. On these considerations I ventured to propose the admission of Typhous Fevers into the attick story, on one side of our Infirmary, to be separated into two wards. From the experience of TWELVE YEARS I am warranted to maintain the *safety* of this measure, if conducted under very easy practicable regulations. During this period, it never was *suspected* that Infection has been communicated to a *single patient* in other parts of the House.

“ Farther,

My Friend knows me too well to suspect that I should advance such an assurance upon doubtful authority. But in order to discern the full force of this remark, it is proper to consider, in what

“ Farther, I maintain that an establishment of this kind is indispensibly necessary in all Infirmaries to preserve them from what is called the Hospital Fever. You may remember that I have collected a considerable number of cases to prove that febrile Contagion, in some instances, remains in the body for many days, and even weeks, in a *latent* state, before the symptoms of Fever commence. Patients ill of other disorders are admitted into the Infirmary, from infectious houses, where they have caught the Distemper. The Fever begins *after* their admission, and frequently infects others in the same ward; when there is not a due attention to fresh air and cleanliness; or when several patients, thus previously infected, are admitted into the same ward. But in the Chester Infirmary, every Fever patient, as soon as observed, is immediately removed into the Fever Wards; so as to preserve all the rest of the House perfectly free from Contagion.

“ During the war, Chester has been unusually exposed to the danger of putrid infectious Fevers. Many new-raised regiments, coming from Ireland with numerous recruits taken out of jails, remained in Chester for a few weeks after their voyage. Great numbers of these soldiers, and their wives, were ill of putrid Fevers, and were immediately received into the Fever Wards of

our

circumstances, and at what distance from the poison, the Infection is communicated in each of these Distempers. One case is recorded in the INQUIRY, (p. 97) where the Infection of the Small-Pox was caught at Chester from a patient passing in the

our Infirmary. If such contagious patients had been distributed in the small publick houses and poor lodging houses through the city, the consequences to many of our inhabitants must have been dreadful.

“ By taking out of a house the first person who sickens of a Fever, we preserve the rest of the family from Infection, together with many of their neighbours, who would otherwise catch it. At this very time, when the inhabitants of Manchester, and of many other places, are afflicted with a fatal contagious Epidemick, only two patients are in our Fever Wards, and both convalescent: and the Apothecary to the Infirmary, who attends the out-poor of the whole city, informs me, that he has *not a single* Fever patient under his care.

“ To one of your superior discernment, it would be superfluous to say, that the observations above advanced are founded upon such numerous facts, that they must give conviction to every impartial inquirer, not only of the *safety* but of the *efficacy* of the proposed regulations. I am confident that our two Fever Wards do ten times more real good in the prevention of misery and the preservation of life, than all the other parts of the Infirmary.”

open

open air upon the walls, and another (p. 32) in the rows, a kind of covered gallery, open on one side to the air.

It appears to be highly improbable that the Typhous Infection should ever be communicated, in the open air, by the common intercourse of society: because visitors, and even attendants, with very few exceptions, escape the Fever, when exposed to it in even the same chamber, if clean, airy, and spacious. The quantity of miasms respired in the latter is incomparably more than it can be in the former situation. It is not, however, intended to be asserted that such an event is impossible, if a person on purpose, or by some rare accident, were to breathe the air which immediately issues from a patient, or from clothes fully impregnated with the poison. During my long attention to this inquiry, not a single instance ever occurred to prove that persons

persons liable to the Small-Pox could associate in the same chamber with a patient in the Distemper without receiving the Infection.

Clothes exposed to Typhous Miasms not infectious.

Another question upon this subject ought to be investigated. Is it to be apprehended that the clothes of visitors, &c. exposed to febrile miasms, can acquire a pestilential quality so as to communicate Infection? I answer decidedly in the negative, and for all the reasons given in the INQUIRY, p. 67, 86; and in the SKETCH, p. 217, 369, 384, 386, 404, 542. If the arguments against such an opinion in regard to the Small-Pox be not fresh in your memory, I must request you to take the trouble, upon this occasion, to peruse with attention the passages above quoted. The proofs which refute any such idea in regard to the Small-Pox, apply much more forcibly to infectious Fevers; because a much larger dose of
air,

air, and more fully impregnated with the latter than with the former poison, is required to produce the pernicious effect. The clothes, &c. of medical and other visitors, exposed to febrile miasms, excite false and injurious alarms, which truth and the interests of mankind require to be refuted.

We have no certain knowledge in what manner infectious Fevers are received into the body. According to the most plausible conjecture, they appear to be communicated by poisonous vapours which issue from the breath, or the insensible perspiration or the excretions of a patient in the Distemper. These miasms are probably taken into the body by the absorbents of the mouth, nostrils, lungs, stomach, or skin.

Every chemist must be convinced, that the insensible perspiration is dissolved in the air, because it is insensible. And the vapour

Typhous Miasms invisible.

vapour which arises from respiration is also dissolved, except when made visible by cold air. No one can doubt that the breath of animals discharges as much moisture when the air is warm as when it is cold. And the loss of weight more than can be accounted for by all sensible evacuations, as discovered by the celebrated Sanctorius, and confirmed by others who have repeated his experiments, clearly proves that there is a constant emanation of vapour from the surface of the human body. If a patient in an infectious Fever had emitted a *visible* vapour, so remarkable a circumstance must, for ages past, have been noticed by every medical visitor. The fact being admitted that the infectious miasms are invisible, it is chemically demonstrable that this poisonous vapour is united with air by solution. Disprove the fact, or admit the conclusion. For it is maintained that no

two substances do, in any instance whatever, exist together, in a perfectly pellucid state, unless they are chemically united with each other. It is the invisibility of the poison which renders it dangerous; if seen, mankind would soon be taught to avoid the pestilential vapour.

In a medical as well as philosophical light, it is an important question whether the febrile miasms are merely diffused in air, or whether they are united to it by solution. I maintain the latter opinion, not hypothetically, but from theory founded on the facts here stated. The general doctrine indeed which I wish to establish would not be invalidated on either supposition. But some important conclusions may be deduced from an accurate investigation of this question. If the febrile miasms be dissolved in air, and attracted from it by clothes, they could not, in the same circumstances, on any known

known principle, be again attracted from clothes by air. This would be contrary to the law of elective attraction, which is as well founded as any in natural philosophy. Again, when a menstruum dissolves any substance, and is sufficiently agitated, every particle of it is equally impregnated.—But, let this theory be determined how it may, the principles laid down in this letter do not rest upon it, but upon the evidence of numerous facts carefully and faithfully ascertained.

Typhous
Contagion
dangerous at
a greater dis-
tance than
fermenting
liquor or fire.

Having employed some pages in an attempt to refute what appear to be false alarms, and to remove imaginary difficulties, in the prevention of epidemical Fevers, I wish now to draw your attention to some opposite, but full as dangerous errors. In France, Germany, and other enlightened parts of the continent of Europe, an opinion has very generally prevailed, that infectious Fevers, the
Small-

Small-Pox, and even the Plague, are never caught, except by contact of the patient or poison. However, as this erroneous notion has never been generally adopted, and at most has only prevailed in a local and temporary manner in Great-Britain, it will not be worth while to engage any of your time in its refutation.* But there is another theoretical opinion delivered on the credit of a physician, whose memory I shall ever hold in the highest reverence, which appears to be so erroneous and so dangerous as to require a full refutation. Fortunately, this can be accomplished in a satisfactory manner, in a few lines.

I received the following intelligence from undoubted authority. A celebrated Professor, ‘when treating upon the ‘cause of Fever, in his Lectures on the ‘practice of medicine, expressed himself

* The reader, who may wish to consider this point more fully, is referred to the SKETCH, p. 93—100.

‘ in the following manner:’ “ Contagion
 “ is a matter always deriving its origin
 “ from the human body. It has been
 “ imagined that Contagions are widely
 “ diffused in the atmosphere, but it has
 “ been proved that, when they are dif-
 “ fused, and at a distance from their
 “ source, they are rendered harmless.
 “ This is similar to vapours of fermenting
 “ liquors, and of fire, which, near to their
 “ source, are destructive of animal life,
 “ but, at a small distance, become inno-
 “ cent, either by mixture or diffusion.
 “ This appears to be the case in Conta-
 “ gions.”

To refute this very dangerous and er-
 roneous doctrine, it will be sufficient to
 remark that, in a small, close, dirty room,
 neither a common fire, nor the fermenta-
 tion of beer, has any fatal, or even a
 pernicious effect. Whereas, in a situa-
 tion exactly similar, the febrile poison

infects

infects all who are exposed to it, except about 1 in 23, or a still less proportion.

As neither a common fire, nor fermenting liquor, could have any injurious effect in the wards of a hospital, this theory unfortunately confirms the pernicious practice of some places, where infectious Fevers are admitted, and indiscriminately mixed with patients ill of other diseases.

In candour it should be observed, that the Professor's doctrine which has been thus freely discussed, was contained in an abstract of a Lecture taken as it was delivered. Though the pupil who wrote it is a very intelligent physician, it is not improbable that some explanation, such as the following, might be omitted in his notes. The Professor might, as he certainly ought to, have said, " I adduce the examples of fire
" and fermenting liquors as a vague and
" remote analogy, not as a literal illustration
" tion

“tion of the nature of Contagion. If you
 “mistake my meaning and act upon it
 “in a strict sense, fatal mischief might be
 “the consequence. In an affair of so
 “much importance, I cannot leave a
 “doubt upon your mind whether my
 “meaning be literal or metaphorical.”

How early
 is a Typhous
 Fever infec-
 tious.

In an investigation of the nature of Typhous Contagion, it is necessary to inquire how early after its commencement the Fever becomes infectious.

In the Xth family of the Ist Table, it is noted that Edson's Fever began on the 19th of July.* He was taken out of his own house into the Chester Infirmary on the 23d, which was the 5th day of his Fever. His wife and children all seem to have caught the Infection before his departure. Upon this point, from an unfortunate accident, my information is much less complete than might be wished. To ascertain on what day of a Fever the

* See p. 232.

infectious

infectious quality begins, I had collected some important facts. But the person who had communicated to me this interesting intelligence, inadvertently burned the papers, which I had returned to him with questions and remarks, in order to obtain such explanations and illustrations as were required to discover the law that nature follows in the propagation of this poison.

On this point, I have made some farther inquiry, but have not yet received answers to my questions. The establishments of Fever Wards at Chester, Manchester, Liverpool, &c. will afford excellent opportunities to ascertain at what period of the Fever its infectious quality commences, by an induction of facts similar to what is related concerning Edson. Let the day of the Fever, and of the patient's removal to the Infirmary, be dated, and when the house was cleansed: then note whether the remaining individuals
of

of the family were attacked by the Fever, and on what days the first symptoms commenced.

Latent pe-
riod of Ty-
phous In-
fection.

From the time when a person receives the Infection till the commencement of Fever, the poison remains in a *latent* state. It is, I believe, a common opinion, that Fevers frequently begin immediately after exposure to Contagion, without the intervention of any latent period whatever. But out of the seventy-two cases here collected, it was not suspected, except in one single instance, that the Fever began immediately from the time when the Infection was caught. And probably the belief of this solitary example proceeded merely from fear and imagination, as the woman's real illness (Table Ist, Case 22^d) was not manifest before the 25th day after exposure to Infection. Till this period she performed her usual labour, a sufficient proof, or at least a strong presumption, that she had previously no Fever.

However, as I am always solicitous to state evidence fairly and candidly on both sides the question, it is proper to mention that, some years ago, I had two patients, who believed themselves affected with Fever immediately from the time when they had caught the Infection. They were both eminently capable of forming an accurate opinion on this subject, being two physicians highly distinguished for their habits of observation and sagacity. Their characters are generally known, and greatly respected by the medical world. The former instance was that tedious Fever of our friend Dr. DOBSON, in which you know I attended him at Liverpool, in September and October 1779. The other you will recollect to be your own case, in which I visited you at Manchester in October 1783. However, with all my deference for the opinion of such accomplished judges, and in their own

F

cases,

cases, yet it is proper to remark that physicians, frequently in the habit of visiting patients ill of infectious Fevers, might previously and unconsciously have caught the Contagion. No one supposes that either the casual or inoculated Small-Pox ever commences immediately on exposure to Infection: the Variolous Fever is *always* preceded by a latent period.

On examination of the III^d Table it appears that out of seventy-two cases the latent period of the *Typhus* (allowing four* days of Fever before the patient becomes infectious) was less than ten days in only five, or probably in only three cases: that it was less than seventeen days in only eleven or thirteen: that it fell upon some of the days between the 17th and 33d day in forty-one, which is considerably more than half the cases.

* See Table Ist, Family Xth.

It may be suspected that the remaining sixteen patients who did not sicken, till a still longer period had elapsed, might not be early and sufficiently exposed to the Contagion. For this reason, it will be proper to specify particularly the circumstances of each case, as explained in the notes on the Tables. From each of the following numbers the period of four days is in like manner subtracted.

Cases. Day on which
Fever began
after exposure.

PROOFS AND ILLUSTRATIONS:

13th ... 40th } Were patients in large farm-houses,
14th ... 44th } and the closeness of intercourse with
the patient is not stated.

87th ... 44th }
69th ... 46th } In farm-houses; but these patients had
70th ... 53d } previously attended infectious cases
73d ... 59th } both night and day so as to be fully
exposed to them.

63d ... 38th }
51st ... 47th }
25th ... 52d } The exposure, in all these cases, is fully
26th ... 54th } explained to be as much as possible,
27th ... 56th } either in small dirty cottages, or by ly-
28th ... 59th } ing in the same bed with the patient.
59th ... 64th }
52d ... 72d }

The 13th and 14th cases first came
under my own observation. The 25th,
26th,

26th, 27th, and 28th, were witnessed both by Mr. CONNAH and myself. The 52d was visited by Mr. MANNING; and the remainder, which were nine, by Mr. TAYLOR. So that you have the united testimony of four witnesses to prove what may appear to be extraordinary facts, a caution which I know you will approve.

On the whole, it appears, that the *latent period* of Infection varies from a few days to two months. Indeed, the number of examples which occurred under ten days, are so few as to occasion some doubt whether those patients might not have received some previous but unobserved Infection.*

* “ At the Old Bailey, in April 1750, in a crowded Court and weather hotter than usual, within a week or ten days at most, many people present at Clerk’s trial were seized with a Fever of the malignant kind; and few who were seized recovered. In less than six weeks time the Fever entirely ceased.”—Foster on the Crown Law, p. 74.

This statement differs a little from my observations. But the report is not given by a medical author, nor is the latent period of each case separately dated. Besides,

Feverg

It is proper to remark, that from the number of days stated in the Tables, to denote the time between the commencement of the first and succeeding cases of Fever in the same family, there should be deducted four days, the period between the beginning of the Fever and the time when it becomes infectious, in order to determine with precision for what number of days the poison remained in a *latent state*.

To many, the various minute details I have thought necessary to give in the investigation of these different questions, may be thought tedious and irksome; but to you, who are fully aware how highly important it is to ascertain, with accuracy, all the properties of a poison alone so extensively fatal to mankind, the description of every little circumstance in such a manner as to remove all doubts, will Fevers arising partly from air vitiated by respiration in a crowded room, may have a shorter *latent* period, than Fevers produced from mere Typhous poison alone.

Opinions
vague and
erroneous.

afford

afford satisfaction. You very well know how vaguely these things have been considered. Opinions have been formed upon the authority of respectable names, without knowing what facts support those opinions. Some have entertained alarming apprehensions that patients in infectious Fever, if placed near the centre of an area of 38,000* square yards, might communicate the Distemper to the inhabitants of the surrounding

* See the Manchester Gazette, April 10th, 1796.

“ BOARD OF HEALTH.

“ At a General Meeting held this day at the Bridgwater Arms, T. B. BAYLEY, esq; in the Chair; the following Resolutions were unanimously agreed on:—

“ V. That the House of Recovery is situated on an area, including more than THIRTY-EIGHT THOUSAND square yards, unoccupied by any other buildings, except those appertaining to the Infirmary.

“ VI. That the Board have the fullest evidence, from WELL-AUTHENTICATED FACTS, and LONG EXPERIENCE, at Chester, that an asylum for Fever patients may be so conducted, as to be perfectly innoxious to the inhabitants in its vicinity.

“ VII. That, impressed with a conviction of these truths, the Board has observed, with surprize and concern,

houses. Others, on the contrary, are so little aware of the pernicious effects of this Contagion as to admit infectious Fevers into the same wards of an Hospital with other patients. Both these opinions have been maintained by men of superior understandings; yet both are erroneous; both are highly injurious. Hence appear the propriety and utility of stating, in detail, a sufficient number of cases, that the reader may form his own opinion, and see upon what foundation his conclusions are supported.

cern, the alarm which has been taken at so important, so salutary, and, as they believe, so unexceptionable, a part of their undertaking. Yet, sensible, of the force and diffusive nature of fear, even though unfounded, and paying due attention to the feelings, as well as to the opinions, of many respectable fellow-citizens, they are willing, from *motives of conciliation*, to relinquish the present situation of the House of Recovery, whenever another more eligible shall be provided."

II. PRAC-

II.

PRACTICAL CONCLUSIONS.

Ist.

Rules to pre-
vent Infect-
ion.

Medical, clerical, and other visitors of patients in infectious Fevers, may fully perform their important duties with safety to themselves.

This proposition I cannot better illustrate than by inserting the following directions, which I communicated some time ago to THOMAS BARNARD, esq; a man whose superior understanding and beneficent disposition are generally known. At his request they were published by the “Society for Bettering the Condition of the Poor,” with a view to their being distributed, so that a printed copy may be put up in every house where there is an infectious Fever.*

* Any number of printed copies of these RULES of Prevention, may be had of the Bookseller of this Society, HATCHARD in Piccadilly.

“ It may be proper previously to observe, that this febrile poison, in a small, close, and dirty room, infects a very great proportion of mankind; not less than 22 out of 23, or a still higher proportion; but in a large, airy, clean apartment, even putrid Fevers are seldom or never infectious. When this poisonous vapour is much diluted with fresh air, it is not noxious.—From a large collection, and an attentive consideration, of facts relative to this Distemper, have been formed the following

RULES TO PREVENT INFECTIOUS FEVERS.

“ 1. *As safety from danger entirely depends on cleanliness and fresh air, the chamber door of a patient ill of an infectious Fever, especially in the habitations of the poor, should never be shut; a window in*
it

it ought to be generally open during the day, and frequently in the night. Such regulations would be highly useful, both to the patient and nurses; but are particularly important, previous to the arrival of any visitor.

“ 2. The bed-curtains should never be close drawn round the patient: but only on the side next the light, so as to shade the face.

“ 3. Dirty clothes, utensils, &c. should be frequently changed, immediately immersed in cold water, and washed clean when taken out of it.

“ 4. All discharges from the patient should be instantly removed. The floor near the patient's bed should be rubbed clean every day with a wet mop, or cloth.

*“ 5. The air in a sick room has, at the same time, a more infectious quality in some parts of it than in others. Visitors and attendants should avoid the current of
the*

the patient's breath,—the air which ascends from his body, especially if the bed-curtains be closed,—and the vapour arising from all evacuations. When medical or other duties require a visitor or nurse to be placed in these situations of danger, Infection may be frequently prevented by a temporary suspension of respiration.

“ 6. Visitors should not go into an infectious chamber with an empty stomach; and, in doubtful circumstances, on coming out, they should blow from the nose, and spit from the mouth, any infectious poison, which may have been drawn in by the breath, and may adhere to those passages.”

II^d PRACTICAL CONCLUSION.

In any house, with spacious apartments, the whole family, even the nurses of a patient ill of a typhous Fever, may be preserved from Infection.

Infection not caught in large, airy, and clean apartments.

The truth of this proposition chiefly rests upon the faith of my own experience, fully related in the preceding pages, which need not be repeated.

No additional instructions are required to preserve the attendants from Infection: even when the wife, mother, or daughter, is the nurse, and extreme anxiety of mind is added to the other causes of Fever. To them, a rigid observance of the rules of cleanliness and ventilation is particularly important. One caution, however, though of a different kind, may be useful. A nurse should never sleep, nor even sit in a current of air, between an open door and window of the sick chamber.

I am

I am well aware that in the most commodious houses, and under the care of the most eminent physicians, the typhous Fever is frequently suffered to spread through a part, or even the whole, of a numerous family. I speak from authentic testimony. By mentioning these facts, I do not mean, however, to impute any peculiar blame to individuals, either for want of knowledge or attention. Such calamities manifestly proceed from general ignorance on the subject. The nature of this poison has never been completely investigated. It has never been proved by what easy methods the Contagion may be avoided.

III^d PRACTICAL CONCLUSION.

*Schools may be preserved from febrile
Infection.*

Schools may
be preserved
from infect-
ious Fevers.

On the visitation of a contagious Distemper in a large boarding-school, I have frequently witnessed that the master or governess suffered the greatest anxiety and dismay. And before I had discovered the laws by which the poison is communicated, and by what method the mischief may be prevented, my mind has often sympathized in these alarms. In many of our large schools through the kingdom, such Distempers have frequently produced dreadful effects. In some instances, the scholars have been permitted to associate together, till the Infection had spread to a fatal extent: in others, they have been sent home, not only to the great detriment of their education, but

but so as to occasion much danger and alarm, by conveying the Distemper among their own relations. The poison, as above explained, generally remains so long in the body in a *latent* state, that a scholar may travel many hundred miles in perfect health; and yet, when he is received into the bosom of his own family, may communicate to them the Contagion of the school. I have heard of parents who regarded the arrival of their own children with terror, even from such scenes of imminent danger.

If the principles above explained be well-founded, much mischief may be with certainty prevented. In every boarding-school, a large airy room ought to be appropriated to the reception of scholars ill of infectious Distempers. Where the patients are numerous, or where there are several patients in different boarding-houses, near each other, it
would

would be more commodious, though by no means indispensably necessary, to provide lodgings for them in a separate house. The poison might perhaps be more easily and more inadvertently conveyed from one room to another, in the same house, than from one house to another. But, even in the latter situation, too great security would be dangerous, and in both cases, a strict observance of the *Rules of Prevention* is fully adequate to the purpose of safety. To prove that these assertions do not merely depend upon speculation, I will recall to your recollection an account of some facts, published upon another occasion,* which fully evince the doctrine which is here maintained.

“ In April 1779, Master PLUMBE, the son of a gentleman of fortune near Liverpool, was attacked in a dangerous degree, with a scarlet Fever and sore throat, in the house of his school-master, the Rev.

* See SKETCH, p. 347.

Mr. VANBRUGH, at Chester. There were at this time thirty-seven young gentlemen, boarders in the family, most of whom, it is highly probable, were disposed to receive this dangerous Contagion. My patient's chamber was situated in the middle of the house, at the landing of the first pair of stairs: all the scholars went close past his door several times a day. At this season, Winchester and several other large schools in England, sent home and dispersed their scholars, on account of this Distemper, which had alarmingly spread among them. Whether this measure, with all its inconveniences, was not advisable, became a serious question. The numerous facts which I had then collected to prove that the Variolous Infection, though probably the most virulent we are acquainted with in this climate, exerted its baneful influence but to a small distance only from the

G

poison,

poison, encouraged me to hope that the Contagion of a scarlet Fever was incapable of producing more extensive mischief. The *Rules of Prevention* were placed on the door of the patient's chamber, and rigid attention to their faithful observance was required. The event fully justified my hopes. Though all the thirty-seven scholars remained in the same house and family during the whole disease, yet not one of them was infected.

“ I do not recollect any observations recorded by authors to determine what proportion of mankind are liable to the attack of the scarlet Fever. In October 1778, out of forty young ladies at a boarding-school in Chester, all but four had the Distemper, twelve very severely, and two most dangerously. This comparative statement of facts shews, beyond all reasonable doubt, to what a little distance from the poison the infectious miasms extend,

extend, and that the *Rules of Prevention* are in this respect fully adequate to their purpose."

It is universally known that the scarlet Fever, with a sore throat, is extremely infectious. From some cases which I have observed and noted, it is manifest, that in this Distemper the *latent* period of Infection is much shorter than in the Typhous Fever. In some instances it did not exceed a week. The facts above related are of such magnitude, and so fully authenticated, that they convey the most useful instruction. It may be applied with confidence, in all boarding-schools, and, as far as we yet know, in all infectious Distempers.

Chester is much celebrated as a place of education for the youth of both sexes, especially for young ladies. Ever since 1779 I have strenuously enjoined the high importance of a strict observance of
the

the *Rules of Prevention*, and an implicit confidence in their efficacy. In some instances, I have known a Distemper communicated to several scholars before it was supposed to be infectious, and before any separation took place. But in the whole period of nineteen years, and in all the boarding-schools of Chester where I was consulted, when the Rules were faithfully observed, I do not recollect a single example where the Infection was communicated to a second scholar.

You will observe, my Friend, that the doctrine which I advance, and the practical conclusions deduced from it, are fully applicable to the Small-Pox, Measles, Scarlet Fever, Chin-cough, Mumps, &c. I could farther explain how certain Catarrhs, particularly the Influenza, are produced by Contagion, and might be prevented. I wrote a paper to explain in what manner the latter Epidemick is communicated,

communicated, some years ago, addressed to a most respectable Society of Physicians, which may sometime be published. But these disquisitions would lead me too far from the business of the present Letter.

Another caution, however, ought not to be neglected. Many Fevers, which commence with inflammatory symptoms, become contagious. All doubtful cases of Fever ought therefore to be immediately separated from the healthy scholars. In such disorders, the most sagacious physician cannot insure perfect safety, that the Distemper has no infectious quality.

The Regulations here recommended for boarding-schools are strictly applicable to nurseries of children. In this situation, I have frequently observed, that when a Fever, Catarrh, &c. attacks one child, it generally affects the rest, with their parents, nurses, &c. By removing the

the first patient ill of any Fever out of the nursery into a separate apartment, the Contagion may be prevented from spreading through the family.

It will frequently happen that so many children in a school may have caught a Fever before the Distemper is supposed to be contagious, that all the patients cannot possibly be accommodated in one apartment. But even in this extremity, nothing can be more easy, safe, and effectual, than to provide spacious, airy, and commodious lodgings in the neighbouring houses. To this arrangement there can be only one objection, proceeding from the erroneous idea that the whole atmosphere of the place is become pestilential. At Manchester you have sadly experienced the pernicious effects of such groundless alarms. And you may recollect that, in the introduction to my *INQUIRY how to prevent the Small-Pox*,* it is mentioned,

* Page 5.

that

that a physician of great reputation, Dr. ASH, of Birmingham, asserted, that he had known the influence of the variolous poison to extend for *thirty miles*. No physician of his time was honoured with a higher reputation than Dr. ASH, which, according to the opinion of competent judges, he was thought to merit. If a man of superior understanding could act upon such erroneous principles, how extensive and pernicious must these professional errors prove, when generally adopted by persons less capable of judging for themselves. But the foundation of these alarms may be determined, in every instance, by the test of observation. What proportion of mankind is liable to receive the typhous Contagion I have already attempted to estimate. Upon these *data* we may safely reason. When many individuals of a family remain in health, we may be fully convinced that neither the whole

whole atmosphere, nor even the air of the whole house, has any pestilential quality. It need scarcely be intimated that these arguments are restricted to the typhous Fever, which proceeds from personal Contagion. It is quite foreign to the present discussion to inquire what numbers in a family are affected by Fever in an unhealthy climate or marshy situation.

In the military profession, it is justly thought of importance to know what is a safe distance from the shot of a cannon, or a musket. If we were to read in the Gazette that a General had ordered a garrison to retreat from a fort because it might be attacked with musketry from a hill at the distance of a mile, all the world would reprobate his ignorance or his cowardice, as most disgraceful.

The apprehension of a physician, that the poison of *Typhus* might communicate the Distemper, through the open air, at
the

the distance of ten yards, is equally visionary and groundless. We hear of people frightened at the danger of passing through a street, because in one of the houses, a patient lies ill of a Fever. The numerous facts related in this Letter incontestably prove, that such fears are quite ridiculous. When danger is uncertain and indefinite, we know not the limits of perfect security.

IVth PRACTICAL CONCLUSION.

In an Hospital, infectious Fevers ought never to be admitted into the same wards with patients ill of other diseases.

Infectious Fevers improperly admitted into wards with other patients.

It having never been accurately ascertained in what circumstances infectious Fevers are communicated, it happens, as might be expected, that some physicians, and of the greatest eminence, act under the influence of superfluous fear. Others,
on

on the contrary, not less distinguished for medical knowledge, rashly permit and advise an intimacy of intercourse which is extremely dangerous. Of the latter kind, undoubtedly, is the error of admitting Fevers promiscuously with other diseases, into the same wards of an Hospital. It is well known, that all the patients, who are associated in the same wards with Fevers, are not infected. And this is another proof that the pestilential influence extends but to a narrow sphere from the poison. But the inhabitants of an Hospital have been unaccustomed to the habits of cleanliness, and on that account, the danger of spreading Infection is greatly increased. Wittingly to allow the admixture of a poisonous ingredient, as arsenic, into the diet of an Hospital, though in so small a proportion that it might not be discovered by its pernicious effects, if taken for weeks together, would be highly
and

and justly condemned. It has been proved, that typhous poison, in a full dose, will infect a large proportion of mankind. It may be presumed that a poison which is so generally injurious, might, even in a small dose, be sometimes productive of mischief. Under the name of the Hospital Fever, there cannot be a doubt that it occasions many fatal consequences. The Manchester and Liverpool Infirmaries, from their first institution, have strictly prohibited the admission of Fever patients; yet into both of them the typhous Contagion was inadvertently received, and it spread in so alarming a degree that the patients were taken out of the wards in order that they might receive a thorough purification. If such pernicious effects were produced in Infirmaries, which were protected by such judicious regulations, what fatal consequences may be justly apprehended in other
other

other Hospitals where infectious Fevers are indiscriminately admitted.

In this way, I had reasoned, upon general principles, on the pernicious effects of mixing Fevers with the other diseases of an Hospital. No particular facts had occurred to my observation to prove, in a direct manner, the truth of this conclusion.

On submitting these remarks, in the words above stated, to some very intelligent medical friends, I was favoured with these interesting and instructive facts. Sir WILLIAM WATSON informed me, that "in St. Thomas's the three physicians I studied under all fell victims to Hospital Fevers, to wit, Drs. AGENSIDE, RUSSELL, and GRIEVE, and Mr. WARRING, surgeon." To these may be added, according to Dr. WOODVILLE, two other physicians of St. Thomas's, namely, "Drs. WATKINSON and KIER, and one of Guy's, Dr. HINCKLEY." But Dr.

SAUNDERS,

SAUNDERS, who confirms all these facts, assures me, that “no physician or surgeon “in Guy’s Hospital, for upwards of thirty “years, has suffered by a typhous or contagious Fever. He explains this difference in a very judicious and satisfactory manner so as clearly to confirm the doctrine advanced in this Letter. “The room “in which the out-patients were prescribed for was of a very small dimension, and extremely crowded, at St. Thomas’s Hospital. The room for the “out-patients in Guy’s was large.”

Again, I have been informed, that “three physicians and a medical student “of one of the largest Hospitals in London died within the space of eight “years of malignant Fevers; the causes “of which, though they could not be “traced to the Hospital, were probably “derived from it.” This intelligence I received from the physician who succeeded

ceeded the last who died; but he did not chuse that his name, or that of the Hospital, should be mentioned.

As the cause of these calamities is so fully explained, and as the means of preventing them is so obvious and so easy, I hope that, in future, no physician, surgeon, or medical student, will ever in future be infected with a typhous Fever in an Hospital.

From the fatal effects of this practice upon known characters, who suffer only a temporary exposure to the Contagion, and are supported by a generous diet, we may form some conjecture of the mortality produced by such measures upon the unknown multitude admitted into these Hospitals, exposed constantly, for weeks, night and day, to breathe an atmosphere impregnated to a considerable degree with these pestilential miasms.

So long ago as 1774 I published an observation, which proves the healthy state

of the Chester Infirmary, that only 1 in 26 dies of all the patients who are admitted. The fatality appears to be *double* this proportion in Hospitals where patients ill of infectious Fevers are indiscriminately received.

Vth PRACTICAL CONCLUSION.

When an infectious Fever is in a small Use of Fever
Wards.
house, the family cannot be preserved from it unless the patients are removed into a separate building.

From the whole tenour of this Letter, you will perceive the reasons why, in our former correspondence, I uniformly and strenuously objected to the measures by which it was attempted to check the progress of the epidemical Fever which so long and so fatally prevailed at Manchester, with assurances that your regulations
for

for this purpose would be unsuccessful. You clearly see the necessity of taking poor patients, ill of Fevers, out of their small, close, and dirty dwellings, into spacious, airy, and clean apartments.

You will remark, that the whole of this inquiry was instituted, before our ingenious friend Dr. CARMICHAEL SMYTH had published his experiments and observations on this subject. He has produced very strong evidence in support of the method which he recommends, to destroy the pestilential Contagion by the vapour of nitrous acid. But I have had no opportunity to make any trial of a process, which so highly merits the attention of medical men, from the respectable testimony by which it is recommended, and from the great benefit which might hence result to mankind. The preliminary facts stated in this Letter will enable others to determine, what efficacy
is

is possessed by the vapour of mineral acids superior to the method of purification, which solely depends upon cleanliness and fresh air.

As the Fever Wards of the Chester Infirmary, in size and situation, are peculiarly favourable to the success of such an establishment; a description of them may be useful, and may suggest the adoption or construction of similar Wards in other Hospitals, for the same important purpose. In the year 1783, on looking out for proper accommodation, I found the attick story on the north side of the building unoccupied, and merely a lumber room. It is ninety-six feet long, twenty-one broad, and being not ceiled, it is open to the roof, which is sixteen feet high. This chamber is divided by a partition in the middle, thus forming two wards of forty-eight feet each in length. Through them is admitted a very free circulation

of air, by nine windows, which are placed on all sides of the wards, and by others in the adjoining passages; by a door in the partition between the wards, and by a large aperture in the upper part of the partition. Several of these windows are constantly open during the day, nor are they all closed even at night, if the patients be numerous, and the weather moderate.

Adjoining to the west end of these wards is a room for the nurse, into which a Fever patient is sometimes admitted. At the east end of the wards, a wash-house is conveniently situated, so that no foul clothes need be brought among the other patients. On the same side and floor, there is placed a separate necessary, which prevents all personal intercourse with the rest of the Hospital.

In order to complete this description it will be proper to insert the following account of the Chester Fever Wards, which

was

was written in the form of a Certificate, to be signed by the medical and other governors of the Infirmary. It was, however, from some particular circumstances, you know, communicated in a Letter to yourself merely on my own private authority, to obviate the alarms at Manchester, lest your House of Recovery, placed in a spacious area, should communicate the infectious Fever to the neighbouring inhabitants.

“ April 27th, 1796.

“ THE Chester Infirmary is a close square building. Its inner area is eighteen yards and a half by fourteen yards. The attick story of all the north side of the house, divided into two wards, has been appropriated to the reception of patients in infectious Fevers ever since the year 1783. Patients who have no Fever are lodged under them, and on all the other sides of this area. The windows of

of the Fever Wards, during the day, are almost constantly open into the area; from whence windows open into all the other wards. One ward is situated within THIRTEEN YARDS of the FEVER PATIENTS, with whom it communicates on the same floor by a passage and doors frequently open; and yet, during the whole period of this establishment, now above twelve years, it has never been suspected that the patients in other parts of the house have caught any Infection from the Fever Wards by any contamination of the atmosphere; nor from any transgression of the *Rules of Prevention*; which require ventilation, cleanliness, and separation, and may be seen in Howard's account of Lazarettos, p. 209. Some dwelling-houses are placed at but a little distance from the Fever Wards: and Stanley-Place, inhabited by very genteel families, is not far distant from them."

You

You will remember at what a very critical moment this intelligence arrived. It is strongly marked in your answer which I have annexed, dated the next day, the 28th of April, 1796.

“ Your letter is this instant arrived. A simple relation of facts as you have stated them, without the formality of a Certificate, will completely answer all our purposes. I shall therefore, as there is not sufficient time to obtain your permission, state at our meeting *to-morrow*, (which must be *decisive* of the scheme) on the authority of information, which I will pledge to be accurate, that “ The Chester Infirmary, &c.”

At the commencement of this Institution, at Chester, apprehensions of the danger of Infection were so prevalent, that no nurse could be persuaded to attend the Fever Wards. In these difficulties, a surgical patient was prevailed on to undertake

Visitors
never, and
Nurses seldom, infected in the
Chester Fever Ward

undertake this office in the men's ward. He caught the Fever, and died of it.

When a proper nurse was procured, she (LOWRY THOMAS) had the care of both wards for eleven years, with only occasional assistance. During this period she was infected by the Fever several times, and died of it in July 1794, on the fifth attack, after a week's illness. The nurse who succeeded has twice caught the Fever, and was each time very ill of it, but otherwise has enjoyed good health, for four years. A night-nurse, as before-mentioned, 1st Table, No. 48, caught the Fever. And other occasional nurses may probably have suffered Infection.

But as far as has come to my knowledge, these four are the only instances of Infection communicated in the Fever Wards at Chester, during a period of fourteen years and a half; from August 1783 till March 1798. Both these nurses (LOWRY

THOMAS

THOMAS and JANE BIRD) were susceptible of Fever. They both exposed themselves to Infection without reserve; even more than was necessary and useful, especially the former. In spite of cautions and exhortations to the contrary, which I have often given her, she used to approach those who were very weak and ill, so close that she must have inspired the infectious breath of a Fever patient, with very little dilution of other air, in thousands of instances, without receiving Infection. Indeed the escape of these nurses from the danger to which they were exposed, must be, in some measure, ascribed to a cause before-mentioned. They had been accustomed, for months, and even years, to breath a dilute pestilential atmosphere. It is probable, on this account that a larger dose of it might be required to produce Infection in them than in other persons.

No

No medical or other visitors were ever suspected to have caught Infection in these Wards, though they have touched the patients in innumerable instances. Yet the apothecary (Mr. MANNING) was susceptible of Infection. He caught a very dangerous putrid Fever, by visiting a poor sick family (which I also visited) as out-patients, in a close dirty room: unreasonable prejudices prevented these poor people, when attacked by the Fever, from accepting the benefit which the Infirmary offered to their choice, of being admitted into the house.

In the vehement contest which you, with difficulty, sustained, for the existence of the House of Recovery at Manchester, you thought it an important truth to establish, by the facts which the institution at Chester has supplied, that the febrile Contagion could not be conveyed through the air to the distance
of

of "THIRTEEN YARDS" from the poison. Upon the evidence of the facts above related, you now would not hesitate to pronounce that a separation one hundred times less, from one room to another, would insure safety from all danger.

As I hope that our proceedings merit imitation, I will here insert the directions given in 1783, which have ever since been observed with complete success.

*RULES for the FEVER WARDS; to prevent
the INFECTION of other Patients in the
CHESTER INFIRMARY.*

I. *Fresh water and coals are to be brought up to the Fever Wards every morning; and other necessaries on ringing a bell.*

II. *No Fever patients, nor their nurses, are suffered to go into other parts of the house. No other patient is allowed to visit the Fever Wards; nor any stranger, unless accompanied by the apothecary or his assistant.*

III. *Every*

III. *Every patient, on admission, is to change his infectious for clean linen; the face and hands are to be washed clean with warm water, and the lower extremities fomented.*

IV. *All discharges from the patients are to be taken out of the ward as soon as possible.*

V. *The floors of the wards are to be washed very clean twice a week, and near the beds every day.*

VI. *All foul linen is to be immediately thrown into cold water; and carefully washed twice out of clean water, in the adjoining room.*

VII. *Blankets, and other bed and body clothes, are to be exposed to the open and fresh air for some hours, before they are used by another patient.*

VIII. *All the bed clothes of the Fever Wards are to be marked Fever Ward, and all the knives, forks, pots, cups, and other utensils, are to be of a peculiar colour, lest they be inadvertently taken among other patients.*

IX. *Several windows in the Fever Wards are to be kept constantly open in the day, except the weather be very cold or wet; and*

some

some of them should not be shut in the night, if the patients be numerous, and the weather moderate.

X. *No patient can be suffered to wear, nor any acquaintance to take away, any linen unwashed, nor other clothes, till they have been long exposed to the fresh air.*

After the dry disquisitions and tedious details which I have thought necessary to submit to your consideration, in order to illustrate this obscure but highly interesting subject, I recall, with heartfelt satisfaction, a bright and most cheering prospect to your view. To you and to your associates, particularly your medical associates of the *Board of Health*, it will afford the highest gratification as the reward of your own meritorious exertions.

The proceedings of our Fever Wards at Chester being unopposed, did not excite any particular attention. They have accomplished their beneficent purposes without

Success of
Fever Wards
at Manchester.

without noise and almost without notice. Hence their value in the prevention of Fevers has never been accurately appreciated. For the opposite reasons, the result of your exertions has become most perspicuous, highly to your own honour, and to the inestimable benefit of your fellow-citizens and of mankind,

“ BOARD OF HEALTH.

“ *Manchester, March 2, 1797.*

“ *Comparison of the number of patients ill of Fever, admitted on the physician's books, at the Infirmary, at different periods, in Portland-street, Silver-street, and other streets in this pile of buildings in the neighbourhood of the House of Recovery.*

From Sept. 20, 1793, to May 20, 1794, 8 months,	400
From Sept. 20, 1794, to May 20, 1795, 8 months,	389
From Sept. 20, 1795, to May 20, 1796, 8 months,	267

24

1056

From

From July 13, 1796, (less than two months subsequent to the opening of the HOUSE of RECOVERY)
to March 13, 1797, being 8 months* - - - - - 25

These wonderful and highly instructive facts are recorded on the most authentick evidence, by “ the books of the physicians, which are kept with the greatest regularity.” Besides, the warm and intelligent opposers of this institution would have detected and exposed any fallacy, if any had existed in this report.

“ The bills of mortality for 1796 shew, that there has been a decrease in the burials, amounting nearly to 400.”

“ In 1797, the expence of pauper coffins was diminished one third.”

These few lines, taken from “ the REPORT of the BOARD of HEALTH, at the second annual meeting, May 26th, 1797,” contain so great a number of

* Of these, in July last, there were five; in August last, one; in September last, none; from the 4th to the 23d of February last, two.

facts, and so publicly authenticated, as will not, I trust, leave the slightest doubt in your mind, or that of any intelligent reader. They clearly prove, beyond all controversy, what are the beneficial effects of the practical regulations deduced from the principles explained in this Letter. The wonderful success of these proceedings, may afford some degree of hope that infectious Fevers might be completely exterminated from a town or district where all the purposes of such an institution are punctually executed. But upon this head, there are some difficulties and doubts.

Regulations
to extermi-
nate infect-
ious Fevers.

It may be proper to inquire, are Typhous Fevers, like the Small-Pox, always produced by a specifick Contagion? Or, on the contrary, are they also generated by close, dirty, crowded rooms, or by certain seasons, and other causes? I have attempted to obtain answers to these questions:

tions: but the evidence which I have collected, not being completely satisfactory, it would be premature to enter into particular details on this subject.

However, an attempt entirely to destroy the Contagion is highly laudable. The more accurately the regulations are observed, the greater will be your success in preserving the poor people from these dreadful calamities. In the House of Recovery, you have judiciously adopted some regulations, which on my recommendation, had been successfully employed by the Small-Pox Society of Chester, to check the progress of that Distemper. 1. *By one of them you require and reward a thorough cleansing of the poor dwellings which had contained infectious Fevers, by washing and airing all the clothes, floors, utensils, &c.; and by offering a double reward in cases of extraordinary danger, and when the attentions have been adequate and successful.*

2. *You*

2. *You have very properly added a provision for the expence of white-washing the walls, which is a cheap and cleanly mode of purification, and also for the charge of purchasing new bed-clothes and apparel, in lieu of such as it may be deemed necessary to destroy.* In a strict medical view, the destruction of clothes, &c. which cannot be purified from Contagion by washing and airing, may seldom be indispensibly required. But dirty rags ought to be burned, because they are not worth the trouble of cleansing, and a supply of good clothes to a poor family can never be more seasonable than after the visitation of an infectious Fever.

3. *You have very wisely adopted another regulation of the Small-Pox Society of Chester, by offering rewards for early intelligence on the first appearance of Fever in any poor habitation.* If this measure be fully executed, the rest of the family may be

be generally preserved from Infection, especially if the methods of purification by cleanliness and ventilation be thoroughly and immediately accomplished.

4. *You very properly require, as was our practice at Chester, that Fever patients should be conveyed to the House of Recovery in a sedan chair, to be employed solely for this purpose, with a moveable lining, which should be of linen, and always exposed to the air after it has been used, and frequently washed. It would be an easy and useful improvement to have a sedan constructed in such a manner that it might occasionally lean backwards in various degrees, so that the patients may lie in a recumbent or half recumbent posture as may best suit their situation. In the state of extreme debility to which patients in nervous and putrid Fevers are frequently reduced, this improvement in the sedan which carries them, would be of the high-*

est importance, not only for the comfort, but even for the life of the patient. To you I need not observe, that in such Fevers, an erect posture frequently occasions fainting fits and other very dangerous symptoms.

5. Upon this head, it will not be improper to take notice, that cleanliness, in every respect, will be very conducive to prevent the generation of Fevers. *For this purpose, as well as other advantages, the streets of a town ought to be frequently and thoroughly cleansed from all dirt. It is always in a putrid or putrescent state.*

Regulations
to prevent
Fevers ought
to be generally
adopted.

To you I need not remark, that the advantages of the regulations for the prevention of Fevers is not limited to such towns as Manchester and Chester. They may be employed, at a very moderate expence, in any village. We both of us have seen numerous examples where febrile Contagion has spread misery and destruction.

destruction through small towns and detached houses in the country. As before intimated in this Letter, I suspect that an infectious Fever had been spreading through some villages of Wirrall in Cheshire for eighteen years. Such calamities may easily, and I trust now will frequently, be prevented.

My friend and fellow-student at Cambridge and at Edinburgh, the Rev. JOSEPH TOWNSEND, rector of Pewsey in Wiltshire, whose superior mind has enlarged human knowledge on various, particularly on medical subjects, gave me the following instructive intelligence. ‘When I had my
‘ putrid Fever I took it from my gardener,
‘ and he received it from a poor cottage.
‘ My room was well ventilated, and no
‘ one caught the Infection from me. Mr.
‘ STEPHENS took the Infection from a
‘ poor patient, but no one received it
‘ from him. RICHARD HOOPER, the
‘ principal

‘ principal farmer, had the same Fever;
‘ but no one took it from him. Both
‘ houses were well ventilated.—In the
‘ year 1787, out of two hundred poor fa-
‘ milies sixty-three poor people died of
‘ Typhus, but no other farmer or princi-
‘ pal tradesman had this Fever. When
‘ one family died off, another succeeded
‘ to their cottage, and the new comers
‘ caught the Fever.’

Many years ago, my dear Friend, by your benevolent disposition and pathetick pen, the publick attention was first excited to commiserate and relieve the poor manufacturers in and near Manchester, suffering under the various calamities of infectious Fever.* Sir WILLIAM CLERKE, and Dr. FERRIAR, have amply confirmed your observations, and employed their best endeavours to check its fatal ravages.

* See PERCIVAL's Medical Essays, vol. i. p. 296, and other papers, which he had previously published.

The benefit of such institutions may be extended even to the metropolis, with still greater certainty of success. Contagious Fevers appear to be the chief cause why there is a much greater proportional mortality in large than in small towns, and houses dispersed in country situations. Lanes, entries, and courts, communicate Infection to each other. Whole families sink down together oppressed with putrid Fevers, in penury and wretchedness, without a single hand to afford them help or comfort.* Such calamities, however

* As few except medical visitors of these gloomy mansions are acquainted with the dreadful misery suffered by poor people ill of infectious Fevers, I will insert a short petition which I addressed to some of my fellow-citizens at a coffee-house in Chester, who (as they always did) immediately supplied the desired relief.

“ A DISTRESSED FAMILY.

“ WILLIAM WAIN, in Nun's-Lane, blacksmith, whose settlement is sixty miles off, has four small children, of whom two lately lost their sight by the Small-Pox. The father and three of the children are now ill of a putrid Fever; and one of them has at present a
mortification

dreadful, might be easily and effectually prevented, and at a very moderate expence, if compared with the inestimable blessings which might thus be attained.

If six or eight Hospitals, situated in different parts of London, would open a spacious ward for each sex, in some part of the building or closely adjoining to it, the most salutary consequences would soon be manifest. Except in checking the ravages of the casual Small-Pox, no human exertion could be employed with so much success to prevent the misery and destruction of the poor as the accommodations here proposed. I have already made what feeble efforts are in my power

mortification in his throat. There is not a sheet in the house. The father and children have only one ragged shirt a piece. Old linen sent to the house, and money collected by the waiter of the coffee-house, are requested, to relieve their extreme wretchedness.—Oct. 29, 1774.”

There is in my possession, the original paper, on which are written the names of thirty-four charitable benefactors.

to

to promote such beneficent establishments. On this subject, I have had an opportunity in conversation to address some exhortations to two most respectable medical friends. One of them, Dr. SAUNDERS, physician of Guy's Hospital, fully assented to the reasonableness of my arguments, and in a future conversation on this subject informed me, that two wards in Guy's Hospital are to be appropriated to the reception of infectious Fevers. The other, Dr. W. HEBERDEN, physician of St. George's Hospital, informed me, that this charity would soon receive a large accession to its funds. And being, as you know, well disposed to entertain hopes that what I ardently wish may be accomplished, already I have formed sanguine expectations that a part of this money may be appropriated to the erection and maintenance of Fever Wards. When Physicians so eminently

nently distinguished for medical knowledge promote such measures, the example, we may reasonably hope, will be adopted in the other Hospitals in the metropolis. Whenever this is accomplished, it will, I hope, be accompanied with the other preventive measures above recommended, of cleansing and white-washing the infectious house whence the patients are taken as directed p. 109, &c.

It is not improbable that in some of the London Hospitals (as at Chester) the attick stories may be empty, and may be appropriated to the reception of infectious Fevers. Upon this subject I have had an interesting conversation with the three* earliest and most zealous proposers of the *Society for promoting the comforts and bettering the condition of the Poor*. And you, I know, will agree with

* WILLIAM MORTON PITT, esq; M. P. WILLIAM WILBERFORCE, esq; M. P. and THOMAS BERNARD, esq.

me that regulations to prevent contagious Fevers will answer these purposes in a more eminent degree than any other benefit which it is in the power of the rich to bestow.

The prevalence of infectious Fevers in London has lately claimed the particular attention of several very intelligent physicians, particularly Dr. WILLAN. Both in the Monthly Magazine, and the Physical Journal, many interesting facts to illustrate this subject, have been published, so as to excite attention and sympathy. Some time ago, Dr. LETTSOM,* with his usual humanity, had not only given a pathetick description, but a mournful picture of a poor family, suffering under the manifold miseries of an infectious Fever. The *Pestis* of LIVY, which he so often mentions in his History, as fatal to the citizens of Rome; and the *Plague*, which

* See his Hints, p. 93.

always

always constituted an article in the London bills of mortality, till the extensive destruction of the latter city by fire, in 1666, were probably no other than Typhous Fevers. Dr. FALCONER, in a paper which he read, some months ago, to the *Literary and Philosophical Society of Bath*, has proved in the most satisfactory manner, that the true *Plague* was never described by any ancient author; not even by THUCYDIDES nor LUCRETIVS, earlier than 535. In this year, PROCOPIUS published an account of the *Plague*, and was the first author who characterised this fatal Distemper by an accurate description of its buboes, carbuncles, and other pathognomonick symptoms. Our learned Friend has employed his wonderful faculty of collecting all the scattered rays of antiquity, in order to illuminate this as he has already done other dark and doubtful points of science, to the comprehension

hension of the dullest, and the conviction of the most sceptical reader.

There have been various attempts, you know, at Liverpool, to adopt the measures so successfully practised at Chester, to prevent infectious Fevers. With great satisfaction I received your information, a few months ago, that a permanent Institution is soon to be established for the general reception of the poor affected with the typhous Contagion. From the interesting facts published by our most intelligent friend Dr. JAMES CURRIE, it manifestly appears, that such an institution in this populous town would have the most salutary consequences, in preserving the lives of many among the lower, and some among the higher, ranks of society. Fever Wards were established in 1787 at Liverpool, in imitation of ours at Chester; but groundless fears soon excluded them from the Infirmary, as he

has

has fully explained.* This circumstance sufficiently proves how important it is to investigate the laws by which the typhous Fever is communicated.

A patient of mine has lately informed me, that at Norwich, on the most respectable medical recommendation, Fever Wards are to be prepared for the reception of the poor inhabitants of that large city.

You will undoubtedly agree with me, that at Bath it is peculiarly our duty to form an establishment to prevent infectious Fevers. As persons of all ranks, afflicted with various maladies, resort hither in great numbers, for remedies which exist in no other place, our special care ought to be employed to preserve not only our fellow-citizens, but strangers, particularly all sick strangers, from such additional Distempers as it is in our power to prevent.

* See CURRIE'S Medical Reports, p. 219.

The apartments in the attick story of the Bath City Infirmary, as was the case at Chester, are at present empty and unemployed, so that no additional building will be required for the purpose. The maintenance of two Fever Wards would undoubtedly require a considerable expence; but in so opulent and charitable a place as Bath, much difficulty of this kind cannot be supposed to exist. When this measure is accomplished, I have no doubt that what in a former Letter I said of Chester may be applied a few years hence at Bath. “ I am confident that our two Fever Wards do ten times more real good in the prevention of misery and the preservation of life, than all the other parts of the Infirmary.”

These speculations lead to an enlarged prospect of general beneficence. In most of the principal towns in Britain, there exists an Infirmary supported by voluntary

tary contributions. In many of them will probably be found two vacant wards in the attick story, which might be appropriated to the reception of Fevers, without abridging the conveniences of the other patients. At any rate, an additional building, to consist of two wards, a laundry, and a bedroom for a nurse, might be constructed at a very moderate expence. You will not think these expectations too sanguine when we consider the active beneficence of our medical brethren, and the zeal with which they offer their gratuitous services to the poor. The rich bounteously subscribe for the relief of the distressed part of the community when afflicted with diseases which cannot personally be injurious to themselves. The motive of self preservation will be added to that of general humanity, to support measures for the extermination of an infectious Fever, which
by

by many unavoidable accidents might bring this malignant poison into their own families.*

In contemplating this pleasing prospect, you will, I know, excuse me for expressing peculiar satisfaction, that the whole plan, which promises such extensive benefit to mankind, originated at Chester, where so prosperously and happily I have spent the best portion of my life. When the institution to prevent the casual Small-Pox, and the regulation to receive patients ill of Fevers into separate wards of the Infirmary, and various similar plans were first proposed, I ever found them ready with heart and hand to adopt, promote, and support such beneficent establishments. To all my medical brethren, and particularly to my intelligent

* The greatest danger of receiving Contagion into a house, arises from linen washed in a poor family, ill of an infectious Fever.

and

and steady colleagues, to Dr. WILLIAM CURRIE, physician, and to Messrs. ORRED, MORRALL, ROWLANDS, and FREEMAN, surgeons, of the Infirmary, I owe every grateful acknowledgment for their uniform encouragement and assistance in the execution of these measures. To them all, every plan was previously and privately communicated, with a request freely to suggest objections and improvements. In this stage of the business, if the slightest breath of opposition had arisen, these charitable innovations would have never existed, and very probably the plans themselves might never have been recorded, but have remained for ever in oblivion. Such candour and confidence merit great praise. Having never entertained the remotest suspicion that my proposals were brought forward with any false pretences or selfish views, they cordially promoted their execution.

On

On my change of situation, you will think me uncommonly fortunate in being placed at Bath so eminently distinguished for the liberality, charity, and superior knowledge of its inhabitants.

VIth PRACTICAL CONCLUSION.

In like manner infectious Fevers may be prevented in the Army and Navy.

Dr. JAMES FELLOWES, physician to Army. the army, has had very great opportunities to make observations on Fevers, in Flanders, Holland, and the West-Indies. Having a good understanding and education, he was well qualified to deduce useful conclusions from the events which he saw. He thinks that Fevers are frequently generated in a camp by foul air. Ten or twelve soldiers sleep in a small bell tent without any ventilation. He has
K observed

observed Fevers produced by this noxious air, as might be reasonably apprehended. In a conversation with me on this subject he expressed an anxious wish, that some safe method could be devised to discharge the foul air from these tents. To accomplish this purpose, I suggested to him a contrivance by grooves in the head of the centre pole of the tent, to permit the foul air to escape, and yet to keep out rain. He approved the design. It was shewn, with a drawing, to a most respectable friend of mine, the Right Hon. THOMAS PELHAM, who honoured this Letter with a perusal. The same idea had previously occurred to him, and he had executed it in a different manner, as he expressed by a drawing, and the following description:

“ Three holes were cut in the upper part
“ of the tent, and a triangular piece of
“ canvas was placed over them, and sown
“ on two sides, so as to let the foul air
escape

“ escape from the cavity left by the third
“ side not being sown down. Such tents
“ were used with great success by the
“ Sussex and West-York Militia at War-
“ ley camp in 1796. The soldiers could
“ bear to have the lower part shut with-
“ out any inconvenience. Before this
“ improvement they always suffered from
“ too great heat or too much cold. When
“ the experiment was made at Warley
“ camp, for ventilating the tents by cut-
“ ting holes in the tops, I questioned
“ several of the men about it, and asked
“ them whether they suffered from cold
“ and rain coming in at the holes, or
“ from heat, by having the tent door
“ shut. The universal answer was, that
“ they suffered no inconvenience; and
“ the observation of many was, that “ *it*
“ *was a power sweeter in the morning.*”

It will be unnecessary to insert either
Mr. PELHAM's drawing or my own, or
to

to give any farther description of them, as there can be no difficulty in contriving various methods by openings on the summit of the tent, to permit foul air to escape, and yet entirely to exclude rain.

These regulations to prevent the generation of Fevers, will require to be executed with much greater exactness, to prevent their propagation. Hospital tents ought to be spacious and numerous. They should be constructed in such a manner as to admit free ventilation. By plentiful dilution with fresh air, and rigid attention to cleanliness, it appears very manifest that soldiers, in a healthy situation, might be effectually preserved from infectious Fevers, Dysentery, &c. The whole army, with a few accidental exceptions, would be constantly fit for duty. Every camp ought to be plentifully supplied with such accommodations, which are most essentially important, not only

to

to their safety, but their military force. Thousands of men and millions of money might be saved by a sufficient supply and judicious employment of cords and canvass, which are neither expensive nor cumbersome provisions for an army. The tent poles any country will supply.

The jails in which deserters from the Deserters. army are confined, for obvious causes, are peculiarly exposed to infectious Fevers. The military prisoners, who pass in great numbers to and from Ireland, are lodged in the castle at Chester, and have, for a long series of years, to my knowledge, been frequently afflicted with this Fever. In 1772 I attended an apothecary who caught this Infection, and died of it. In the year 1793, there were 17 out of 18 deserters in this prison, ill of this Fever at the same time. The county magistrates, affected with the melancholy situation of these prisoners, and alarmed at the danger

ger of their communicating the Contagion to the inhabitants of the city, desired the Physicians of Chester to give their advice and assistance in what manner the mischief might be prevented. We addressed a memorial to Government, recommending the adoption of regulations similar to what had been long practised at our Infirmary. These measures were approved, and executed with complete success. And there is reason to hope that they will be widely extended for the general benefit of the British army. For in a few months after our correspondence with the Right Hon. Mr. WINDHAM, secretary at war, a medical Inspector, sent from the War-office to visit all the military Jails and Hospitals, brought to us again our own rules, injoining a strict observance of them, which I had the satisfaction to learn was the order of Government.

If

If we take into consideration how long Infection remains in the body in a latent state, that, in this period of time, deserters are sometimes removed to their regiments or ships, at a great distance, we shall clearly understand in what manner infectious Fevers may be introduced into our army and navy.

According to the judicious recommendation of our friend the Rev. Dr. PEPLOE WARD, of Chester, to Administration, a numerous body of deserters from the army were permitted to enter themselves into the navy. But before their removal to the ships, I prevailed upon him to allow a proper time for the performance of quarantine, in a clean jail. During this period, some of the deserters fell ill of the Fever, from the Infection which they had previously received. This caution deserves general attention, particularly in the navy. Sailors taken out of an infectious jail should

should never be mixed with the crew of a ship, till a sufficient time had elapsed to discover whether any latent poison had infected them. Such considerations are of great national importance.

Navy. The whole doctrine of febrile Contagion explained in this Letter is in every respect applicable to the preservation of sailors and soldiers on board ships of war, and even transports. In regard to cleanliness and ventilation, and the separation of patients ill of infectious Fevers into the sick birth, or an hospitalship, I understand that excellent regulations are already established in the British navy. And it is not the purpose of this Letter to repeat what is already known, and what has been fully explained by others.

One remark may be new and important, deducible from the facts above stated. From the ignorance which has hitherto prevailed, to what extent, through the medium

medium of air, Fevers are infectious, I apprehend that there must have arisen many difficulties and embarrassments greatly to the disadvantage of the patients, so as generally to confine them in a pestilential atmosphere within their sick births. You will have no doubt in agreeing with me that persons ill of infectious Fevers may be brought upon deck, and placed indiscriminately among the healthy soldiers and sailors of the vessel, without any hazard of communicating the Contagion; provided that they are dressed in clean clothes. On these occasions, the sick births should be perfectly cleansed. The bedding, chests, bundles, &c. ought to be brought upon deck, and exposed to the fresh air. It will be superfluous to remark, that all the Rules of Prevention, recommended for Fever Wards, p. 105, ought to be observed in sick births.

Among

Among other causes of the wonderful achievements of the British fleets, it is not the least that the sailors, during the whole war, have enjoyed a high degree of health. You will agree with me, that this happy circumstance is chiefly to be ascribed to the wisdom of medical regulations and improvements. And you will not be displeased that I thus claim some and no inconsiderable share of honour to our profession from the late glorious victories of the British navy.

In this probationary state of existence, for good but inscrutable purposes, there is, in all human affairs, an admixture of pain and pleasure, fear and hope, disappointment and enjoyment. On looking at the world around me I have reason, much reason, to be gratefully thankful to the wise Disposer of all things, that hitherto my lot has been comparatively fortunate, prosperous, and happy, with a
mind

mind well disposed to relish such felicity. But to one who has passed through such a busy and varied scene of life; who has had such intimate intercourse, and for so long a period of time, with the different ranks of society, some painful anxieties have undoubtedly been my portion. Upon these and many other occasions, the contemplation of plans for the prevention of Distempers, and others, for the improvement of the children of the poor in habits of industry, morality, and religion, has ever had the happiest influence in restoring a placid serenity of mind, and in administering heartfelt consolation in scenes of the deepest melancholy. What sublunary object can be esteemed of higher value? Pursuits of this kind may justly be said to bring with them their own reward.

To you this Letter is addressed, as a witness of several transactions which it records,

records, and as a Physician, whose private and professional character has long merited the sincerest regard and esteem of your faithful Friend,

JOHN HAYGARTH.

BATH, APRIL 9, 1801.

POSTSCRIPT.

THE Regulations recommended, in this Letter to Dr. PERCIVAL, to prevent infectious Fevers, are equally applicable to all other Contagions propagated through the air, even the PLAGUE. If such a calamity should ever visit this country, an establishment exactly similar to Fever Wards would be excellently adapted to check its progress.

In my Letters to the late Mr. HOWARD, published in his Posthumous Works, I have recommended some improvements in the regulations of quarantine to prevent the importation of the PLAGUE. I have since endeavoured to prevail upon the wise and vigorous Government of this country to establish prompt and efficacious measures,

measures, instead of the tedious, inadequate, and useless delays, so injurious to commerce, which are at present practised in the Lazarettos of the Mediterranean. At some more auspicious season, these humble but earnest representations may merit attention.

AN ADDRESS

*To the College of Physicians at Philadelphia,
on the prevention of the AMERICAN
PESTILENCE*

GENTLEMEN,

AS the subject of this Disquisition is of very high concernment to mankind, and particularly to America, you will not think that the liberty taken by a stranger can need any apology. Besides our common origin and language, we are guided by the same principles in the investigation of philosophy and physick. I might, indeed, as an individual, plead a more intimate connection with your country by the honours I have received from the University of Cambridge in New-England, and the American Academy of Arts and Sciences.

My

My mind being employed, as the preceding Letter explains, in collecting evidence to discover in what manner infectious Fevers are propagated, and in devising the best regulations for their prevention, you will readily believe that my attention was particularly excited on both these points, by the Pestilence which has occasioned such dreadful devastation in America. Dr. LINING,* of Charleston, South-Carolina, in 1753, had clearly and distinctly discovered and recorded, that in 1732, 1739, 1745, and 1748, the Pestilence then denominated the yellow Fever, had been imported from the West-Indies into America.†

I have very deliberately and impartially considered the “ Facts and Observations
“ relative to the nature and origin of the
“ Pestilential Fever which prevailed in
“ the city of Philadelphia, in 1793-7 and

* See Edinb. Physical Essays, II. † Appendix I.

“ 8,” published by the College of Physicians. The clear, consistent, and complete evidence* which you have adduced, has produced in my mind the fullest conviction, that the Contagion was introduced into America from the West-Indies. I have deliberately considered all the subsequent publications on this interesting subject which I have been able to obtain, without the slightest change of opinion.

This being the case, the opposers of this doctrine, though numerous and respectable, allege causes and produce arguments, which to me appear to be entirely groundless. Most unfortunately, this medical schism has excited pernicious doubts in the minds of extraprofessional men, even of enlightened understandings. In these circumstances,

* As this *Address* may be perused by readers who have never seen this publication, it may be useful to insert a few extracts in the Appendix II.

the legislative and executive governments cannot act with firmness, decision, and effect. In situations of danger, unanimity of opinion is of the utmost consequence for the safety of the people.

On these considerations, I think it may be of great importance to the welfare of America to review the opinions which have produced these most pernicious effects, by discouraging every judicious measure for the prevention of this Pestilence.

When you had made so plain and useful a discovery that the calamitous destruction of the inhabitants of Philadelphia proceeded from a foreign and imported Pestilence, regulations would have been instituted, with one mind, to exterminate the poison, and to guard against the return of a similar calamity. But a Physician of eminent abilities, in an evil hour, most unfortunately ascribed the generation of this Pestilence with which
America

America was afflicted in 1793, to "*putrid coffee*," without any proof, or the slightest degree of probability.

To sanction this doctrine, a number of cases have been produced, and supported by strong and respectable testimony of many physicians, at first as individuals, and afterwards as "*The Academy of Medicine of Philadelphia*," in a publication, intitled, "*Proofs of the Origin of the Yellow Fever in Philadelphia*." But however strong the testimony, and respectable the witnesses, it appears to me that the Academy have alleged the most frivolous, inadequate, and groundless causes of this calamitous Distemper.

They chiefly ascribe this Pestilence to the noxious air emitted from the snow Navigation, (p. 6) which arrived at Philadelphia with a *healthy* crew from Marseilles, on the 25th of July 1797. 'There was in the hold of this
' vessel

‘ vessel a quantity of vegetable matters,
‘ such as prunes, almonds, olives, capers,
‘ &c. *some* of which were in a state of
‘ putrefaction. A most offensive smell
‘ was emitted from this vessel *after* she
‘ had discharged her cargo, which was
‘ perceived by persons several hundred
‘ feet from the wharf where she was
‘ moored.’ Prunes, almonds, olives, and
capers, could only exist in small quantity, and are very little liable to run into putrefaction. To add, if possible, to the improbability of this account, it is stated, that the offensive smell was emitted ‘after’ she had discharged her cargo. It is too obvious to escape notice that the stench arising from the hold of a ship proceeds from the putrefaction of substances which belong to all the three kingdoms of nature, vegetable, animal, and mineral; and which are found in *every* vessel when she has discharged her cargo.

In

In the same spirit, the Academy adduce facts to prove that a Fever was produced in one ship ‘ by the noxious air
‘ generated from a few bushels of potatoes, (p. 7;’ in another, ‘ by the wine
‘ which had putrefied in the hold of a ship;’ in a third instance, they say, ‘ the Yellow Fever was generated by the
‘ noxious air of some rotted bags of pepper, on board of a French Indiaman carried
‘ into the port of Bridge-town. All the white men, and most of the negroes,
‘ employed in removing this pepper, perished with the Yellow Fever, and the
‘ foul air affected the town, where it proved fatal to many of the inhabitants.’
But the 4th example next alleged manifestly *betrays* the whole purpose of this publication. The Academy say, ‘ The
‘ Fever which prevailed along the shore of the Delaware in Kensington, we believe originated from the noxious air
‘ emitted

‘ emitted from the hold of the ship Hul-
‘ dach. The air was generated by the
‘ putrefaction of *coffee*, which had re-
‘ mained there during her voyage from
‘ Philadelphia to Hamburgh, and back
‘ again.’ These bold assertions, sanctioned by respectable names, are well adapted to frighten the ignorant, but have a very different effect upon the mind of the intelligent reader. They are in a high degree improbable. Previous to the accusation of putrid coffee as the cause of the Pestilence in 1793, no medical author, as far as I recollect, has ever ascribed to vegetables in such a situation, a power to generate an infectious Fever, or any Fever, or indeed any other disorder whatsoever. In similar circumstances, thousands of people have breathed the air near putrid vegetables in an incomparably higher degree, both by sea and land, without receiving the slightest injury.

It

It is not a little curious, and, indeed, highly instructive to observe, that Dr. CALDWELL signed this opinion, that the Yellow Fever of America was generated from putrid vegetables, as an individual, in answer to Governor MIFFLIN's Letter, dated 6th November 1797, and assented to it as an academician, on the 20th day of March 1798. Yet, in an Oration spoken on the 17th of December 1798, with great declamatory parade, bold* assertions, and flowery diction, he takes no notice whatsoever of this doctrine, but ascribes the whole mischief to a peculiar constitution of the atmosphere, as proved by the multitude of grasshoppers, flies, and muskitos. The dirt of Philadelphia he also blames, but does not allege that it existed in any unusual degree. No clearer proof need be required of self-contradiction and condemnation. It is wonderful, that the Phy-

* See Appendix III. sicians,

sicians, Philosophers, and Statesmen, of America, have not been struck with this circumstance so as to open their eyes against the pernicious delusion, which has so marvelously and dangerously prevailed concerning the origin of this Pestilence.

Upon a question of such great importance to America, and probably to Europe, it is proper to take notice of another dangerous error. In the newspapers, in conversation, and in letters from America, it is asserted with great positiveness so as to obtain general belief, that the Pestilence appears in the sea-port towns, not because imported thither from the West-Indies, but generated there in the docks, common sewers, &c. which are described as peculiarly filthy, and in an offensive state of putrefaction. But the Academy take no notice of such a cause. Whence we may conclude, that it cannot bear the remotest semblance of truth to persons on the

the

the spot, who have an opportunity to compare facts relative to the commencement of the Contagion with the situation of the docks, common sewers, &c. When the Academy were at a loss to substitute any causes, and did substitute such improbable causes, of this Pestilence, contrary to the clear and convincing evidence which you have published, to explain in what manner it was imported from the West-Indies, they certainly would not have neglected to produce so obvious and plausible an origin of the Distemper.

By such vague and ill-founded notions, the measures of Government have been obstructed in all the sea-ports of America. An Act of quarantine has been passed for the port of Boston in New-England, of which a medical Friend transmitted to me a copy. On perusing this Act, I was not a little astonished to find that all its principal provisions were directed to destroy domestick

domestick dirt, and scarce a single regulation was ordered to destroy the *Pestilential Poison** that might be imported from the West-Indies, Philadelphia, New-York, Salem, Newbury-Port, Portsmouth, &c. where the Pestilence then existed. When speculative errors lead to such bad consequences, they highly merit refutation.

When the publick opinion is unsettled, and bewildered by variety of conjectures, the wildest and most improbable hypotheses will be proposed, and will gain some proselytes. Mr. WEBSTER, of Connecticut, who I have been well informed is a man of sense and erudition, and editor of one of the best papers in the United States, has published two large volumes on Epidemical and Pestilential Diseases. He ascribes their generation to comets, earthquakes, volcanos, tornados, hailstones,

* The regulations of quarantine explained in my Letters to Mr. HOWARD, to prevent the *Plague*, are exactly applicable to the prevention of this *Pestilence*.

flights of wild pigeons, large flies, dead haddocks on the coast of Norway, abundance of shads on the American coast, black worms, &c. &c. It must be owing to this strange uncertainty of opinion that an author of so respectable a character has ventured to publish such whimsical and irrational opinions. The question of cause and effect is in many instances of disease difficult to ascertain. In most cases we have nothing to direct our judgment except the close connection of place and time. But in Mr. WEBSTER's History these essential circumstances are wholly neglected. He ascribes Plagues, Pestilence, Small-Pox, Scarlet Fever, Influenza, &c. in one quarter of the globe, to earthquakes, storms, &c. &c. in another, and at a different time, allowing an interval of months or years. In some instances he does not allow the cause to precede the effect. His imagination darts
from

from earth to heaven in a kind of phrenzy, very unlike a philosopher, and with an inconsistent wildness that would disgrace a poet. Thus he ascribes a high tide in June 1788 to a comet which appeared in the following October, and which could only be seen by a telescope.

For the cause of the Pestilence which so sorely afflicted America in 1793, he goes back as far as 1788, to collect an account of all the earthquakes, (in Iceland and in Tuscany) comets, tornados, high tides, hail-stones, meteors, sickly fish on the Banks of Newfoundland; a halo; a famine in India and China; dead haddocks on the coast of Norway, &c. &c.

To these causes, which happened in distant parts of the world, during a period of five years, he ascribes the American Pestilence: though such phenomena of nature have not been, perhaps, more frequent during this time, than at any other

other period since the creation of the world. An author of this kind would require no notice, if the positive and plausible style of his book did not occasion apprehensions that it might mislead the unwary reader.

This Address to the *College of Physicians at Philadelphia* accompanies my Letter to Dr. PERCIVAL, on the Prevention of Fevers, because I have the fullest confidence that the measures which it recommends, from my own experience at Chester, would effectually suppress the Pestilence of America.

Between one infectious Distemper and another, there exists a very close analogy in regard to the nature of the poison, and the laws by which it is communicated. The Plague, the casual Small-Pox, Measles, Scarlet Fever, Chin-Cough, Mumps, Influenza and other infectious Catarrhs, are all Fevers. They are all of them
propagated

propagated by a poison soluble in air, and invisible, in the form of miasms. None of them renders the atmosphere infectious farther than a few feet from the patient or the poison. This position I have proved in the clearest manner in regard to the Small-Pox, the Scarlet and Typhous Fever;* and there is no proof, nor even a probability, that the infectious quality of any other Distemper contaminates a larger portion of air. In all of them there is a latent period, between the time of receiving the Infection and the commencement of Fever, but of different durations in each.

These reasons evince, to a high degree of probability, that regulations, founded upon the principles which have been proved by extensive experience to be perfectly adequate to the prevention of the casual Small-Pox at Chester, and of the

* See Inquiry § viii. Sketch p. 549. Letter p. 35-40, 80.

Typhous

Typhous Fever at Chester and Manchester, might be applied with similar success to exterminate the American Pestilence.

But when positive and direct proofs can be obtained, physicians should never reason by analogy. For this reason, in December 1798, and again in January 1799, I addressed some questions* upon this interesting subject to my very intelligent correspondent Dr. WATERHOUSE, professor of physick at Cambridge in New-England. In the Boston Gazette of May 23d, 1799, my Letter was published. It contained inquiries to which Dr. W. could not give satisfactory answers on account of the contradictory opinions and warm contentions of medical parties in America.

Failing in this application to my Friend, I now address you, Gentlemen, as a learned society, constituted by Government, whose peculiar duty it is to discover the nature

* See Appendix IV.

of this Contagion, and the laws by which it is propagated, and to devise regulations for its prevention. For this purpose I solicit the favour of you to appoint one or more of your Fellows as a committee to institute inquiries similar to those described in my Letter to Dr. PERCIVAL, and particularly to write me full and explicit answers to the questions which I have proposed. None but active and zealous members, eager in the pursuit of improvement, ought to accept this office.

Both the College and the Academy, especially the former, prove by numerous facts that this Pestilence spreads by Infection. But there is one common error, and of great importance, which I am confident more minute and accurate observations will correct.

The College intimate, that the Infection may be caught through the medium of air, at the distance of one hundred or
one

three hundred yards from the pestilential poison. The Academy allege, that it may be caught at the distance of a mile or a mile and a half.

The Small-Pox probably contaminates the atmosphere to as great a distance as any infectious Distemper whatsoever. One of the most respectable Physicians in England thought that from observation he had known it to extend for thirty miles.* Whereas, in another work, I have proved by facts, that the sphere of Variolous Infection, in moderate cases, does not extend in the open air to the distance of half a yard, and in the worst but to a few yards from the poison.† What I have said of the Small-Pox is strictly applicable to the American Pestilence.‡ If the infectious

* See this Letter p. 87.

† See INQUIRY how to prevent the Small-Pox, § viii.

‡ See CAREY'S Account of the Plague or Malignant Fever of Philadelphia in 1793, p. 68.

“ The jail of Philadelphia is under such excellent regulation, that the disorder made its appearance there

influence extend to the distance of thirty yards, no human power could prevent its infecting the inhabitants of the whole house, the whole street, and the whole

only in two or three instances, although such abodes of misery are the places where contagious disorders are most commonly generated. When the Yellow Fever raged most violently in the city, there were in the jail one hundred and six French soldiers and sailors, confined by order of the French Consul, besides eighty convicts, vagrants, and persons for trial; all of whom, except two or three, remained perfectly free from the complaint. Several circumstances have conspired to produce this salutary effect. The people confined are frequently cleansed and purified by the use of the cold bath—they are kept constantly employed—vegetables form a considerable part of their diet—in the yard, vegetation flourishes—and many of them being employed in stone-cutting, the water, constantly running, keeps the atmosphere in a moist state, while the people of Philadelphia have been uninterruptedly parched up by unceasing heat. ELIJAH WEED, the late jailor, caught the disorder in the city, in the performance of the paternal duties towards his daughter, and died in the jail, without communicating it to any of the people confined."

This fact, which is casually mentioned for another purpose, fully refutes any idea of a *Pestilential Constitution* of the atmosphere. It farther disproves the opinion that the pestilential miasms are capable of contaminating the air to the distance of one hundred, or even of ten yards.

town,

town, where ever it may come. If one patient could infect all persons capable of receiving the Pestilence within thirty yards, these in like manner would infect others to the same distance. On these principles, its progress through the largest city would be swift and certain.

This view of the subject demonstrates the great importance of the investigation pointed out by the questions proposed to Professor WATERHOUSE. In order fairly to reason upon this subject, the first point is to ascertain what proportion of mankind is liable to receive the Pestilence, when fully exposed to it in a small, close, and dirty room, for days and nights.* Whence we may conclude,

* See CAREY's Account, p. 60.—“ It has been dreadfully destructive among the poor. It is very probable, that at least seven-eighths of the number of the dead were of that class. The inhabitants of dirty houses have severely expiated their neglect of cleanliness and decency, by the numbers of them that have fallen sacrifices. Whole families in such houses have sunk into one silent, undistinguishing grave.”

“ The

when many persons in the adjoining or in the same house have escaped the Distemper, that they had not been exposed to an infectious dose of the poison.

When these principles are clearly and fully established so as to become the public creed, measures may be taken effectually to prevent its progress, exactly upon the same principles as I have explained in my publications on the Small-Pox, and in this Letter to Dr. PERCIVAL, supported by extensive experience at Chester and Manchester. Your fellow-citizens will then have no occasion to incur the mischievous confusion of deserting their own habita-

“ The mortality in confined streets, small allies, and close houses, debarred of a free circulation of air, has exceeded, in a great proportion, that in the large streets and well-aired houses. In some of the allies, a third or fourth of the whole of the inhabitants are no more.”

By comparing this extract from CAREY's *Account* with the former in the preceding note, it appears to be highly probable that the poison does not render the air of a whole house, nor even of a whole chamber, infectious, if large, airy, and clean.

DATA. tions.

tions. If commodious houses, with large airy chambers, be provided for the reception of patients ill of this Pestilential Fever; and if effectual care be taken to destroy this poison by separation, cleanliness and ventilation, all danger will soon cease; and all apprehensions of danger will gradually abate.

J. H.

APPENDIX.

I.

Extract of a Letter from Dr. Lining, Physician at Charleston in South-Carolina, to Professor Whytt, of Edinburgh, December 14, 1753.

“**T**HAT Fever, which continues two or three days, and terminates without any critical discharge by sweat, urine, stool, &c. leaving the patient excessively weak, with a small pulse, easily depressible by very little motion, or by an erect posture; and which is soon succeeded with an icteritious colour in the white of the eyes and the skin, vomiting, hæmorrhages, &c. and these, without being accompanied with any degree of a febrile pulse and heat, is called in America, the *Yellow Fever*.

“ This Fever does not seem to take its origin from any particular constitution of the weather, independent of *infectious miasmata*, as Dr. WARREN has formerly well observed.

“ For within these twenty-five years, it has only been four times epidemical in this town, namely, in
the

the autumns of the years 1732, 39, 45, and 48, though none of these years (excepting that of 1739, whose summer and autumn were remarkably rainy) were either warmer or more rainy (and some of them less so) than the summers and autumns were in several other years, in which we had not one instance of any one being seized with this Fever; which is contrary to what would probably have happened, if particular constitutions of the weather were productive of it, without infectious *miasmata*. But that this is really an infectious disease, seems plain, not only from this, that almost all the nurses caught it and died of it; but likewise, as soon as it appeared in town, it soon invaded new-comers, those who never had the disease before, and country people when they came to town; while those who remained in the country escaped it, as likewise did those who had formerly felt its *dire* effects, though they walked about the town, visited the sick in all the different *stadia* of the disease, and attended the funeral of those who died of it. And lastly, whenever the disease appeared here, it was easily traced to some person who had lately arrived from some of the West-Indian Islands, where it was epidemical.”*

* See the Physical Essays of Edinburgh, vol. ii. p. 372.

II.

Extracts from the "FACTS and OBSERVATIONS relative to the Nature and Origin of the PESTILENTIAL FEVER, which prevailed in the city of PHILADELPHIA. By the Colleg^e of Physicians of Philadelphia.

1. PESTILENCE OF 1793.

"About the latter end of July, and beginning of August, 1793, a Fever of a new and very alarming nature prevailed in this city. It first appeared in Water-street, between Mulberry and Sassafras streets; and all the cases of this Fever were, for two or three weeks, evidently traced to this particular spot. A considerable part of the city, Northern Liberties, and district of Southwark, became gradually infected, and it was not until the coming of the frost, that the disease subsided, after having proved fatal to nearly five thousand persons.

"The peculiarity of the symptoms, the remarkable inefficacy of remedies generally used for diseases which commonly occur in the same season of the year, with somewhat similar symptoms, its great mortality and contagious nature, sufficiently evinced, that a very unusual disease existed among us; which was soon discovered to be what is called the Siam, in the French, and the Yellow Fever in the British, West-Indies." See Facts, &c. p. 3, 4.

2. PESTILENCE OF 1797.

“No instance has ever occurred of the disease called the Yellow Fever being generated in this city, or in any other part of this state, as far as we know; but there have been frequent instances of its having been imported, not only into this, but into other parts of North-America, and prevailing there for a certain period of time; and from the rise, progress, and nature, of the malignant Fever, which began to prevail here about the beginning of last August, and extended itself gradually over a great part of the city, we are of opinion, that this disease was imported into Philadelphia by some of the vessels which arrived in the port after the middle of July. This opinion we are further confirmed in by the various accounts we have received from the best authorities we could procure on the subject.”*

3. PESTILENCE OF 1798.

“In the months of June and July last, twenty-seven vessels arrived in this port from Cape Nichola Mole, Jeremie, and Port-au-Prince, in the Island of Hispaniola or St. Domingo, places which had long been garrisoned by the British forces, and of conse-

* See farther proofs in the “Narrative of Facts,” published by the College and quoted by the Academy, in order to criticise it.

quence more peculiarly adapted to the generation of Pestilential Diseases.

“ It is a well known fact, that these places were evacuated in great haste, and that a considerable number of American vessels which lay there, were employed to transport the British garrison.”

“ We have further proof that the Yellow Fever prevailed in those ports while the above-mentioned vessels lay there.*

“ On the fifth day of July last, six or eight of these vessels, having a large number of passengers on board, of course a quantity of cloathing, bedding, &c. brought off in the greatest haste, themselves exposed to all those circumstances which are generally allowed to produce contagious Fevers; in this situation they arrived at the fort, where they were detained on board for twenty days, an occurrence well adapted to heighten the violence of the Contagion. On their arrival at the city, after this detention, they generally lay at the wharfs between Wal-

* *Letter from Dr. STEVENS to Dr. GRIFFITHS,*
December 29, 1798.

“ During my residence in Santo Domingo and the Cape, I received frequent information that the Yellow Fever prevailed in almost all the sea-port towns in the French part of Hispaniola, particularly at Cape Nichola Mole. It raged so violently at this latter place, and the mortality was so great, that it obliged the British to abandon the post sooner than they intended.”

nu

nut and Spruce-streets. And it is well known, that at this part of the city the Fever first appeared, about the latter end of July and beginning of August, and spread from thence to almost every other quarter. These are facts too recent and too generally admitted, to require further proof.

“ On the evening of the eighth of July, the armed ship Deborah, Captain Edward Yard, arrived at the fort from Jeremie. She buried *eight* persons during her stay there and return, and sent *six* sick to the Marine Hospital. She was one of those employed to transport troops in the West-Indies. After a detention of ten days this vessel came up to the city. We have been assured that some of her crew were brought up before her arrival.

“ On the twenty-eighth of July, the Deborah was moved to Kensington, where she was hove down. We can clearly trace the rise and progress of the disease at that place to this vessel, and also the first appearance of it in some other parts of the city to persons who had been on board her.”

III.

Extract from Dr. CALDWELL's Oration.

“ Pestilence can become epidemick only, when aided by a concurrent constitution of atmosphere. This position is founded on the collective experience
of

of ages. Where such a constitution does not prevail, sporadic cases of pestilence may indeed occur, but they will again disappear, and leave surrounding individuals unhurt. The nature of that peculiar state of atmosphere, favourable to the propagation of pestilential diseases, has hitherto eluded the researches of philosophers. The reality of its existence, however, is sufficiently established from the obvious effects to which it gives rise. Though ridiculed, of late, by some physicians, under the denomination of an *occult* quality, reason and observation still declare it to be a quality resting, for the certainty of its existence, on evidence as substantial, as that which supports the great Newtonian principle, the gravitation of all terrestrial bodies.”

“The gravitation of terrestrial bodies” is no discovery of NEWTON’S; but a fact well known to every inhabitant of the earth ever since the creation. The visionary Hypothesis, here quoted, was never supported by any proof whatsoever. It would not deserve any notice, if the opinion did not generally prevail among physicians, so as to be productive of great mischief among mankind, by permitting the Plague, Small-Pox, American Pestilence, &c. to spread, without any attempts to check their fatal progress. On this consideration, a refutation of it,
by

by numerous well-authenticated facts, with reference to many others, is inserted in the following

Extract from HAYGARTH'S INQUIRY how to prevent the Small-Pox, § viii.

“ The Small-Pox was epidemical in Chester from May 1777 till January 1778, that is, for nine months, particularly for the last six; during which time I attentively marked its progress. 1. At the beginning two or three families were seized, not immediate neighbours, but in the same quarter of the town. 2. Then the children of a neighbourhood, comprehending an entry, had the Distemper, but it did not spread from them as a centre. 3. In no part of the town it has spread uniformly from a centre, farther than through an entry or a narrow lane, where all the children of a neighbourhood play together. 4. Afterwards the poor children in several parts of the town were attacked, at a considerable distance, in some places half a mile, off each other. 5. Yet, many portions of all the large streets were not infected in November, but so late as December and January, the Distemper returned to attack many who had escaped, when it was in their neighbourhood some months before. 6. In Handbridge, a part of Chester, only separated from the rest of the town by the river Dee, not more than about

about seven had been infected during the epidemick, though great numbers of children, in this quarter, are liable to the Distemper. 7. In the middle of the city, in one street, (King's-street) of twenty-four who had never passed through the Distemper, only *two*, both in the same house, were attacked. 8. During the summer and autumn of 1777, while this epidemick was general in Chester, many of the surrounding villages, (as, Christleton, Barrow, Tarvin, &c.) and some larger towns, (as Nantwich, Neston, &c.) were visited by the Small-Pox in one or more families, yet the Distemper did not spread generally through any of these towns. As both the state of the air, and the Variolous Poison, were the same in these places as in Chester, why did it not equally *infect* their *air* as well as ours? 9. At Frodsham the Small-Pox began in May, and gradually became more frequent, so as to be remarkably epidemical on one side of the street for several months, yet nearly one half of the town, on the opposite side of the street, still remained quite uninfected on November 18th, 1777."

"The epidemical Small-Pox, which has been attributed to a peculiar constitution of the atmosphere, by the sagacious SYDENHAM, and by most other physicians who have since written on this subject,

ject, may be supposed incompatible with this conclusion, but I think it can be explained in a satisfactory manner, on the principles of this INQUIRY.

“ As particular facts convey more certain conviction than general observations, I request the reader to consider the following Table. The first and second columns are quoted on the authority of my very ingenious friends Dr. PERCIVAL and Dr. AIKIN.

“ Deaths by the Small-Pox, in 1781.

	Manchester.	Warrington.	Chester.
January - -	3	7	1
February - -	5	8	0
March - -	10	5	0
April - -	17	5	1
May - -	31	5	0
June - -	44	6	0
July - -	55	3	0
August - -	46	4	1
September -	53	3	0
October -	36	0	2
November -	31	2	1
December -	13	2	1
	<hr/> 344	<hr/> 50	<hr/> 7

“ In January, 1781, the Small-Pox was brought from Dublin to Parkgate, where it was not propagated to a second family. In the same January, it

it was brought from Liverpool to Neston, where it continued to spread for several months. Yet Parkgate and Neston are two towns, or rather two parts of the same town, not a single mile distant from each other. I relate this fact on the best authority, Mr. WOLSTENHOLME'S, surgeon, of Neston.

“Hence we see, on surveying several large neighbouring towns, as Manchester, Warrington, and Chester, that the Distemper is very seldom absent from any of them, but that it becomes generally epidemical at uncertain periods in each, and at times which hold no correspondence with one another. In like manner, on comparing several neighbouring villages, we observe, some entirely free from the Distemper, others have a few only infected, others suffer a general seizure.—The observation is generally true in regard to this part of Great-Britain; but it will be thought sufficient to have produced a few instances.

“Whoever considers the numerous facts here faithfully related, will perhaps be convinced, that the Distemper becomes epidemical, neither through any peculiar state of the air, nor of the human constitution. No such difference can reasonably be supposed to exist in large towns within twenty miles of each other, much less in neighbouring villages,

M

and

and least of all in different parts of the same town or village. If what is above advanced be true, the seeming mystery may be explained in a few words. *The Small-Pox continues spreading as long as persons liable to the Infection approach patients in the Distemper or infectious matter, either in the same chamber, or very nearly in the open air, and then ceases.* When it has attacked none, or but a few in any place for some years, a large number of the young generation becomes liable to infection; if, therefore, it be introduced in these circumstances, many of them nearly approach the infectious, become themselves infectious, and propagate it to others, so that the Distemper seizes all capable of having it, except a few who are kept from a free intercourse with the rest; this is called the epidemical Small-Pox. In other places, the Distemper does not spread from a Small-Pox patient, none liable to Infection approaching within the infectious distance, either because it has lately been epidemical, so that nearly all have had it, or because the patient is kept separate from the rest, through his own prudence or their fears. When only one or two families are infected by the Small-Pox in any town or village, no one will dispute it is possible, that no person liable to the Distemper may come within the infectious distance.

distance of the poison, before it be destroyed by washing or other methods of cleanliness. If this be done by accident or design, I maintain that the Distemper will spread no farther. On the contrary, no one acquainted with the present habits of carelessness in regard to this poison, and how generally it is dispersed in clothes, furniture, and food, will doubt that some of it, while fresh, may come within the infectious distance of some persons liable to the Distemper, and, in consequence, that these will be attacked. The more patients are infected the more poison will be generated, and, if many in the place are susceptible of Infection, the more quickly and generally it will spread. May not this view of the matter entirely explain the difference between the sporadick and epidemick Small-Pox, so often mentioned by medical authors?"

This doctrine is fully confirmed by many other facts recorded in the *INQUIRY**, and in the *SKETCH*, of a Plan to exterminate the casual Small-Pox, by my very respectable medical correspondents, as well as my own future observations.†

It is highly probable, that a similar statement of facts would lead to the same conclusion in regard to the American Pestilence.

* See *INQUIRY*, § viii.

† See *SKETCH*, p. 222, 226, 237,—241, 335, 338, 441, 443, 452, 549, 557.

IV.

From the Boston Gazette, May 23, 1799.

Extract of a Letter from JOHN HAYGARTH, M.D. F.R.S. &c. &c. to BENJAMIN WATERHOUSE, Professor of the Theory and Practice of Physick at the University of Cambridge, New-England, respecting the means of preventing the YELLOW FEVER, (so called.)

Bath, Jan. 25th, 1799.

“ Four years ago I sent you some observations of mine on the best method of performing quarantine for the Plague, printed with the posthumous works of the late Mr. HOWARD, and a Letter, containing inquiries to illustrate the nature of the Contagion which has spread the fatal Pestilence through Philadelphia and some other cities. You are intimately acquainted with the mode of preventing the Small-Pox, proposed in my “ INQUIRY, SKETCH, and CORRESPONDENCE.” No subsequent fact has occurred, or been communicated to me, which can in the slightest degree invalidate the principles attempted to be established in those publications. In like manner I have discovered that mankind may be preserved from the Contagion which produces the Typhous Fever with still greater ease and certainty. I find, 1st. that this poison infects

22 out of 23 persons exposed to it for nights and days in a close, dirty, small room; 2d. That, in a clean, airy, and spacious chamber, few or none are infected. These facts prove incontestibly to what a narrow sphere the Typhous Contagion is limited; And 3d. That the poison remains generally from ten days to six weeks, or longer, from the time of exposure till the commencement of the Fever, in a *latent* state. Upon these principles I proposed to receive all the poor citizens of Chester ill of infectious Fevers into separate wards of that Infirmary. The proposal was approved, and has been executed for fifteen years. During this period the “*Rules of Prevention*,” which you will find in HOWARD on Lazarettos, p. 208, have effectually answered their intention, so that not a single patient in other parts of the house was ever *suspected* to be infected by the Fever.

“ A fatal and infectious Fever had long prevailed at Manchester and its neighbourhood. In 1796, the Chester plan of taking poor people ill of infectious Fevers out of their own houses, and receiving them into separate wards adjoining to the Infirmary, was adopted. The success of this measure has been most wonderful; the number of Fever patients, in a certain district of the town, for two years and eight months,

months, which preceded this establishment, was one thousand two hundred and fifty-six; something more than the average of four hundred a year. The Fevers in the same district, from July 1796 (a period commencing two months after the establishment of *the House of Recovery*) to July 1797, (being twelve months) were only twenty-six; of these, in the last four months, (from March to July 1797) there was only one Fever patient. In the year 1796, there was a decrease of near four hundred in the bills of mortality at Manchester, comparing the two years which preceded and succeeded this Institution. The charge of the overseers for coffins was diminished nearly one-third in the latter period.

“ I cannot entertain a single doubt that exactly the same measures would speedily and effectually exterminate the Pestilence which has so dreadfully afflicted America: as far as we may trust to the analogy of the Variolous and Typhous Contagions. But *you ought not to depend upon analogy*, when you have such an opportunity as the late melancholy progress of this mortal Distemper must have presented, to obtain the actual observation of facts. By means of your medical pupils dispersed in various parts of America, you may collect the most interesting intelligence, in like manner as was accomplished by the

the

the late celebrated Dr. ALEXANDER MONRO, in Scotland, relative to inoculation of the Small-Pox. You are so intimately acquainted with the mode of investigating the nature of the Variolous Contagion, successfully employed in the "INQUIRY and SKETCH," that you will immediately discern the importance of the following questions, which I request the favour of you to disseminate through America; and to solicit explicit answers to each of them.

1st. *What proportion of persons fully exposed to the Pestilence are infected?* Cases to determine this question ought to be circumstantially related. *Do mothers, wives, nurses, sisters, or daughters, who have most intimately attended their relations, sometimes, and how often, escape Infection?*

2d. *To what distance from the poison is air rendered infectious?* Upon this point will obviously depend the practicability of preventing and exterminating the Distemper. Collect all the well-authenticated facts in your power, where one or a few in a family were attacked, and the remainder preserved. *What numbers walk through the streets, where infection exists, but remain unaffected by it? How many persons in the houses adjoining, or opposite to those which contain the Pestilence, escape infection?* To remove all doubts, let it be noted,

noted, from some meteorological register, in what direction the wind has blown during the epidemick. Let names and dates be accurately stated. A minute detail of circumstances affords most satisfactory conclusions.

3d. *How long does the poison remain latent in the body; that is, what period elapses between exposure to Contagion, and the commencement of the Fever?* On the determination of this point, the rules of quarantine ought to be formed.

4th. *Can it be ascertained at what time and in what manner the poison was brought to Philadelphia, New-York, &c. and the small towns in the neighbourhood of these cities?* This intelligence would be of the greatest advantage to prevent future calamities, but which will be very difficult to obtain; as the authors of such dreadful mischief will be sedulous to conceal the transactions which have produced it.

“Lest my Letter of the 8th of December 1794 may have miscarried, I will send a copy of the queries it contained.

“1stly. When and where did the Fever begin at Philadelphia, &c. what were the names and local circumstances of the ten first patients attacked, and at what distance of time from each other?”*

* “Since this question was proposed to Professor WATTERHOUSE, it has been answered in a satisfactory manner in regard

“ 2dly. Did the Distemper spread from the first and other patients who were attacked at the beginning of the epidemick, to the leeward, or windward?

“ 3dly. Or, on the contrary, did it principally spread in those families who had intercourse with the infected?

“ 4thly. What ships arrived at the ports of Philadelphia, &c. previous to the commencement of

regard to Philadelphia, as above explained, by the College of Physicians. In TYTLER's Treatise on the Plague or Yellow Fever, (p. 144 and 506) there is a clear account of the means by which the Pestilence was imported from the West-Indies into New-Haven, Connecticut, in 1794, into Chatham on Connecticut River, into Providence in Rhode Island, into Portsmouth, &c.

The evidence concerning its importation into New-York in 1795 is strangely contradictory.

Dr. WARREN, Professor of Anatomy, declares, as to the Pestilence of Boston, which began in July 1798, “ *that its origin is domestic, I have not a single doubt.*”* But Professor WATERHOUSE, in the copy of TYTLER's Treatise which he sent to me, with his usual sagacity and discernment, writes this note: “ *I must dissent from my worthy colleague.*” It is manifest, however, that the former opinion had become the prevailing creed, because the Act of the State of Massachusetts, which passed on the 18th of June 1799, to choose a *Board of Health*, makes provisions to destroy domestick, not imported, Contagion.

In the discussion of this question there is one remark, which is highly important and instructive. “ This Pestilence has “ never visited any other town in America than the sea-ports, “ which have constant intercourse with the West-Indies,”

* See TYTLER's Treatise, p. 505.

the epidemick? Whence came they? Was the Fever at that place?

“ 5thly. At the height of the epidemick, and in the part of the city where it principally raged, were any and what number of families totally free from the Distemper, at certain periods of its progress?

“ What publications among you give the most instructive account of this Pestilence, which appears to be falsely denominated the *Yellow Fever*. Do any of them contain the intelligence I solicit in regard to the communication of the poison? Can you send me a full abstract of such intelligence? Is this Distemper some species of the Plague? CHISHOLM appears to me to give the most intelligent account of the fatal Pestilence in the West-Indies. Does it correspond with your observations in North-America? Your Letters respecting the Small-Pox, printed in my late publications, contain matters so

This fact is universally admitted, I believe, by all the contending parties, and it has been particularly confirmed to me, on the best authority, by his Excellency the Honourable Mr. ELLSWORTH. This circumstance alone will have great weight with every judicious reader, and will produce an high degree of conviction that the American Pestilence *always* originates from foreign Contagion.

The manner in which the Plague and the Small-Pox are introduced into a place, frequently eludes the most diligent researches; and yet no person in this country doubts, that these Distempers *always* originate from some communication of the Pestilential and Variolous Poisons.

much

much to the purpose, that I entertain very sanguine expectations of useful information from your observations on this destructive Distemper.”

POSTSCRIPT.

THESE inquiries were originally sent to Professor WATERHOUSE, in 1794 and 1799. They are now addressed to the College of Physicians at Philadelphia. I am solicitous farther to address them to the respectable and intelligent Physicians of New-York, Boston, and of many other towns in America, whither this Pestilence has been imported during the last eight years. If explicit answers to each of the questions here proposed were communicated to the publick, by medical witnesses in various situations, a body of evidence would be obtained, of great importance to their country and to mankind.

Dr. WATERHOUSE, in a Letter to me, says, “ I cannot gratify you by giving answers to your interesting queries. Our Physicians are still divided in their opinions respecting this Malignant Fever, and such contradictions have been advanced that the impartial searcher after truth is soon discouraged.”

When Physicians of the best abilities are thus bewildered by the violent medical factions which have most unfortunately prevailed in America, it is hoped that

that the candid reader will *excuse* the interference of an impartial stranger, on an occasion which he judges to be highly interesting to the cause of truth and of humanity.

Addition to the Note, p. 120.

After "T. BERNARD, esq;" read,

Just after this sheet was printed, I received, from the *Society for bettering the Condition of the Poor*, a copy of Dr. MURRAY's benevolent proposal to institute Houses of Recovery for patients ill of infectious Fevers in London, published by the desire and at the expence of the Society. This circumstance fully confirms two observations which are advanced in the preceding pages; that such establishments would be cordially promoted, with their usual liberality and beneficent spirit, both by Physicians, and by this Society.

On this occasion, it will not be irrelevant briefly to consider the question, whether Fever Wards should be annexed to Infirmaries as at Chester and Manchester, or should form separate institutions. The former arrangement is undoubtedly to be preferred where ever there is an opportunity, as most economical, as most beneficial to the poor objects of such a charity, and, beyond all comparison, as best adapted to preserve all Hospitals themselves free from infectious Fevers. No recapitulation of arguments will be required to establish these obvious conclusions.

Published, by the same Author,

1. AN INQUIRY *how to Prevent the SMALL-POX*; with the Proceedings of a Society for promoting General Inoculation and preventing the Casual Small-Pox in Chester.

The Second Edition, corrected, is in the Press.

2. A SKETCH of a Plan to Exterminate the SMALL-POX from Great-Britain; with a Correspondence on the Nature of the Variolous Contagion with Mr. DAWSON, Dr. AIKIN, Professor IRVINE, Professor WALL, Professor WATERHOUSE, Dr. PERCIVAL, Mr. HENRY, Dr. CLARK, Dr. ODIER, Dr. CURRIE, and the Magistrates of Geneva. Two vols. in boards. Price 8s.

3. Of the IMAGINATION, as a Cause and as a Cure of Disorders of the Body, exemplified by *Fictitious Tractors* and *Epidemical Convulsions*.

Speedily will be Published, with additional Remarks.

The Second Edition.

Cruttwell, Printer, Bath.



